

# POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND

REVISED TRADE MARK, GREAT BRITAIN, NO. 50000

REG. U.S. PAT. OFF.



SEE PAGE 974



# MAKE up to \$30 DAILY with this MAGIC DISC

Clouds of Steam Pay You  
Immense PROFITS

What strange element is hidden in this curious disc which makes people gasp when they see it placed in a pan of water—a dish, a boiler, a bath tub—and in split seconds amazingly produce Boiling, Sizzling, Steaming Hot Water—2½ times quicker than by any other water heating method!



**Not Much  
Larger Than  
This Picture**

This astonishing performer is the new and remarkable LUX ELECTRIC WATER HEATER—one of the fastest selling household utilities ever devised.

**Earn Rich  
Profits Daily**

LUX has beaten all records for tremendous sales wherever introduced. It amazes all who see its breath-taking, dynamic action prove itself before their very eyes. Just plug in light socket anywhere—early morning, late at night—and instantly you have scalding, boiling hot water for any need. LUX coins Big Profits day after day for men and women agents—either full or spare time. It sells, sells, sells—to every home, office, store, business house, doctor, dentist, nurse, garage, filling station and hundreds of others. Sold at a low price everyone can afford—operates hours for a fraction of a cent.

You can comb the entire field for a faster seller—YOU WON'T FIND IT. LUX appeals to all by its practical economy and constant, everyday serviceability. You can sell dozens in a few hours and make

The Magic-like LUX ELECTRIC WATER HEATER. Made of pure, heavy aluminum with special patented, new principle Heating Element. Non-scalding. Eight-foot solid rubber water-proof cord. For either AC or DC 110-volt current. Fool-proof. Guaranteed.



**Hot Water for the  
Bath—At Any Hour**



**UP To \$1.95 CASH in ADVANCE EVERY SALE—  
No Investment—Amazing Free Offer**

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Mail the coupon for liberal FREE OFFER and sales plan that starts you "cashing in" at once with no investment. DON'T DELAY.

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COMPANY**  
67 Jackson St.,  
ELKHART, IND.

**MAIL THIS AT ONCE**

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67 Jackson St., Elkhart, Ind.  
Please rush Free details. Prove to me  
what I can do in my locality with LUX.

Name .....  
Address .....  
City ..... State.....



# Mystery "TWIN-RAY" Light Makes Night Driving Safe

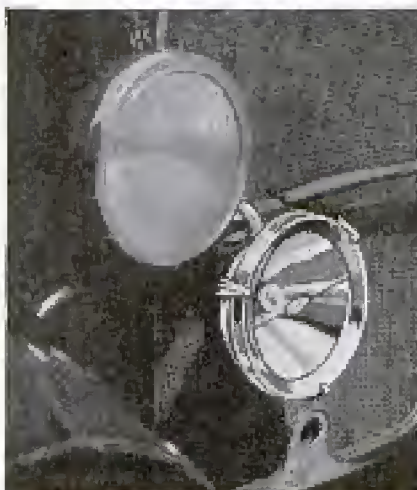


## AGENTS Cleaning Huge Profits With This Instant Seller!

**A** GENTS and distributors all over are getting set for the biggest money of their lives with a brand-new road light that ends all the dangers of night driving. 24,000,000 motorists want this protection which guards lives against the dangers of glaring lights—yet lights up the road as clear as day. Hundreds of men have made big fortunes out of make-shift spot lights that only did half the job; hundreds more have pulled huge salaries out of lights that couldn't approach this new protection, in efficiency.

### 67,000 Candle Power— No Glare

So judge for yourself what you can do with a light like this—a light that throws a 67,000 candle power beam for over 1,000 feet—yet which absolutely CAN'T glare in the eyes of approaching drivers! A light which costs 30 per cent less than the prices charged for some of the best sellers in the market! A light that not only can't glare itself, but which kills the glare of the other fellow's oncoming "brights!" No wonder this light was awarded the Grand Prize and two gold medals at the Paris International Exposition—and no wonder that the very earliest agents are already cleaning up big—cleaning up like Kinney, who sold 12 lights in a day—and made \$96 for just a few hours' work. No wonder now car distributors are equipping cars like Packard, Nash, Cadillac and Chevrolet with it.



You can attach and adjust the Speedlight in fifteen minutes. Once fixed, it can't get out of alignment—it keeps a steady 1000-foot beam of glareless light between you and every danger.

There's no light like it in the world. It's not a spot. It embodies an absolutely new principle in headlighting, discovered by a famous lighting engineer.

### 70 Miles Per Hour—Safely At Night

With this amazing Speedlight you can drive at 50—60—even 70 miles an hour, with perfect safety, on a road as brilliantly lighted at midnight as at mid-day. Lights up the road in spite of driving rain and snow—defies even thick fog.

**MAIL THE COUPON NOW** and find out how we're putting the chance of a lifetime into your hands, with an amazing introductory offer. Find out how you can use this great device to build up a *crew* of your own—and double your earnings—earnings which by themselves will be bigger than you ever saw before. Do it now, before you turn this page!

**SPEEDLIGHT CO., Dept. 10-H**

1731 Belmont Ave.

Chicago, Ill.

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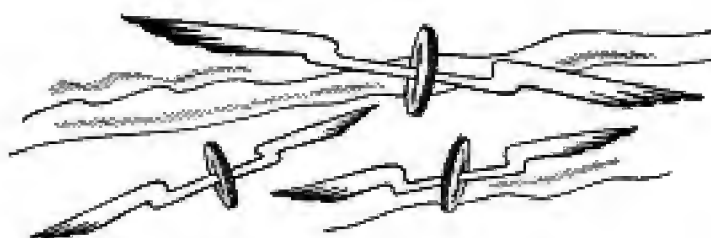
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# PENNIES FOR WINGS

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DAY in and day out you take wings by talking over your telephone . . . with friends . . . the grocer . . . the doctor . . . a relative hundreds of miles away . . . and every month you get a bill for this service.

Perhaps a single call made during this period has been worth more to you in time, money or convenience than the whole amount of your bill. But the telephone company makes its charge — not on any such basis — but on what it costs to give the best possible service to its customers.

The Bell System has voluntarily taken the position that the telephone business is a public trust. Its policy is to give the best possible service at the least cost consistent with financial safety.

The more telephone subscribers there are,

the more valuable telephone service becomes to each subscriber. Unlike most other businesses, the telephone industry does not enjoy reduced costs as the number of customers increases. On the contrary, the trend is upward. To offset this, the American Telephone and Telegraph Company takes advantage of every scientific advance and aid to efficiency which can possibly reduce service costs—and these savings are used for the benefit of the subscriber.

The twenty-four Associated Companies in the Bell System are pledged to this ideal . . . to give constantly better telephone service at the lowest possible rates . . . to reduce, by every means in their power, the number of pennies that you pay for wings.

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★ AMERICAN TELEPHONE AND TELEGRAPH COMPANY ★





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*Or a big one, made unasked, because the firm wants to keep you satisfied?*

*You can compel the raise you want—fairly and squarely.*

**Y**OU don't start home nights with your eyes closed—stumbling and groping—and expect to get there. Then why are you stumbling blindly along, hoping and waiting for your next raise, praying that it may be more than a few dollars a week and knowing you'll probably be disappointed?

Common sense and your own experience tell you that while modest raises may be given for loyalty and long service, the big ones come only as rewards for increased ability—greater value to your employer.

If you want to get to the place where salaries are substantial and raises come unasked instead of as a form of business charity, you must make yourself an unusual man—you must train yourself out of the masses into the classes.

That you may know exactly what we mean, here are three cases, "three out of over fifty thousand in our files."

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C. P. A. Coaching  
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Personnel Management  
Banking and Finance  
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Railway Station Management  
Paper Salesman's Training  
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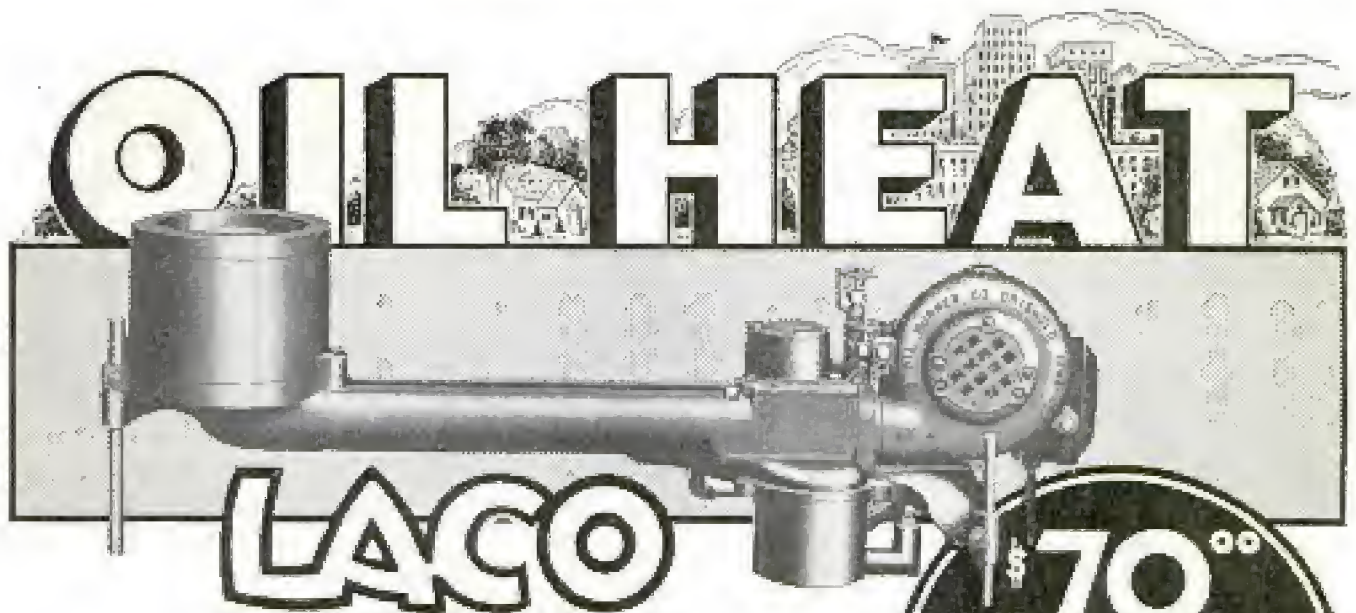
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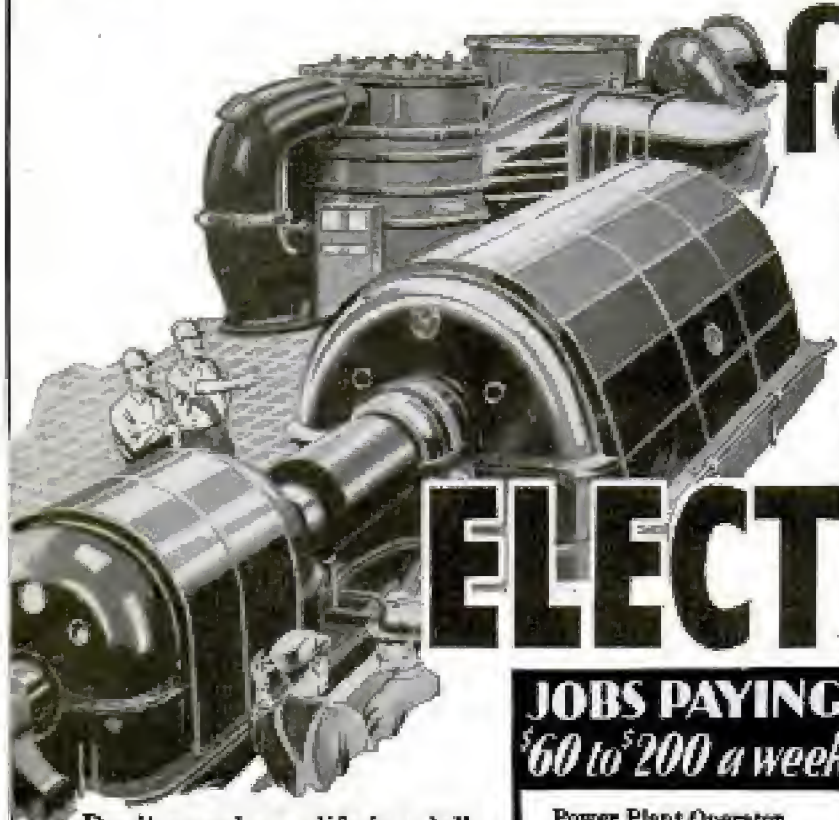
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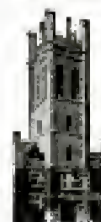
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Pioneer's practical training teaches you how to get spare time jobs a few weeks after you start. Many students pay the low cost of Pioneer's course doing a few week-end jobs. **Complete Spray Finishing Outfit and all equipment furnished without extra cost.** When you graduate, Pioneer's Employment Service will assist you in getting a job without charge.

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TO  
BIG PAY**

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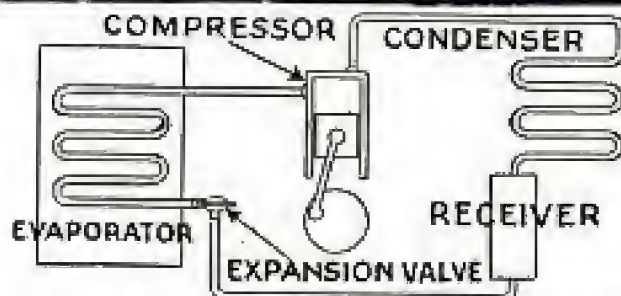
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Clyde Stonebringer, Washington, D. C., made that in spare time the first year. YOU can make Big Money playing for Dances, on the Stage.

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Tremendous demand for Hawaiian Guitarists for Broadcasting. MY COURSE TRAINS YOU QUICKLY for BIG PAY! You get everything you need to insure quick social and professional success. Write NOW for FREE BOOK.

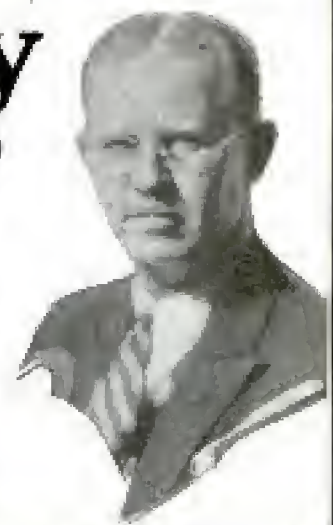
**Hawaiian Studio 52061, NEW YORK ACADEMY OF MUSIC, 106 Fifth Avenue, New York City.**





# WHY Are these Fellows Making Big Money When You Aren't?

Are they better educated? I can tell you, they are not, if you have even average education. Have any of them any special "pull" or "drag" that makes them successful? No—only a short time ago, every one of them was in the same position you are in now—ill-paid, without much hope of ever really succeeding. Are they better men—more ambitious than you? Well—that's for you to say. Read their story, and then answer yourself.



## Let This FREE Book Tell You Their Secret!

ON the right of this page you see four men. Each of these men is an average, ordinary fellow. They all have average educations, average abilities, and average intelligence. Yet every one of them is successful in a profession which many people think is difficult to succeed in!

For a long time, every one of these chaps let himself be bluffed into thinking that this profession was hard. The very fact that this profession is the highest-paid in the world led them to that belief. "You have to be born with a gift for it," they said to themselves.

And then, a short time ago, each one of them got hold of certain facts that amazed them. A book which came to them, free, showed them that instead of being difficult, this great profession, salesmanship, could be made the easiest in the world, as well as the best-paid. In 1930, when most men were in terror of losing their jobs, and taking cuts in salary, these fellows were going along at salaries often two or three times as big as they had been!

And these men are not alone! Literally scores of men who never dreamed they could sell—fellows who thought that their lack of education, their lack of influence and money was going to keep them in the rut for the rest of their lives, have suddenly broken away from their low pay and their uncertain employment, to become important business men—at pay increases from 50% to as high as 300%.

There was nothing mysterious about this rise. They learned, quickly and easily, in a few short months, the secrets which many successful men worked for twenty years to get. They proved that there is no such thing as a born salesman—they proved that **training**—learning only the right methods, under the direct guidance of successful men, is the quickest, easiest, and surest way to reach real success.

Yet their training didn't cost them a day or a dollar from their regular jobs. Quickly and easily they learned, right in their own homes, in a few spare minutes every day, the secrets, the methods, and the sales strategy which brought them big salaries and real independence.

Right now you too can find out how they did it. You, too, can accomplish



what they did, if you have the ambition and the self-confidence they had. Before you do anything, however, I want you to see for yourself how many men have succeeded this simple, easy way. That's why I'm making you this offer now: Simply mail me the coupon below, for your free copy of "The Key To Master Salesmanship." You'll find in this book the facts and the secrets of success that started thousands of men to the big pay they now enjoy. You'll see the actual stories of scores of men—men just like yourself—who learned how salesmen are made, and who are comfortably well off right now, as a result.

If you have the brains and the ability to hold on to a job in these hard times, make the most of them. Find out now how the same brains and ability can bring you the job—the salary—the independent success you want. Mail that coupon now, and let "The Key To Master Salesmanship" show you how you can leave the futureless, ill-paid run of ordinary jobs and join the ranks of successful men.

Chas. Michel, President  
**NATIONAL SALESMEN'S TRAINING ASSOCIATION**  
Dept. G-103, 21 W. Elm St., Chicago, Ill.

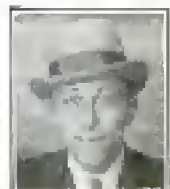
### WHY..

Why can't more men make the sales success that E. L. Sterling of Detroit has made? His pay increased 250%? The man or is—very much. Learn from your free copy of "The Key To Master Salesmanship" the easy plan which Sterling followed.



### WHAT..

What enabled Jacob Dowell of Indianapolis, Ind., to make an extra \$100 in two hours as he used to make in weeks? Dowell tells us he has done this time and again—the too-largely-unknown secrets from the pages of this book.



### HOW..

How did Mastercraft of Detroit break loose from an ill-paid job? He tells us also how he not only showed him the way out of the rut, but taught him so well that, in his first year as a salesman, he equalled the results of seven men who had been selling for as long as 15 years!



**National Salesmen's Training Association**, Dept. G-103, 21 W. Elm St., Chicago, Ill.

Without obligation to me, please send my copy of your FREE book, "The Key To Master Salesmanship," with full details of your Free Employment Service, and other service features.

Name.....

Address.....

City.....State.....

Age.....Occupation.....



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**T**HE man who really wants to become an expert in radio . . . who knows that the better his foundation, the better his chances . . . and who is willing to spend a year preparing himself . . . such a man will make no decision until he has read the complete story of RCA Institutes, Inc.

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Like other professions, radio rewards only those who excel. The poorly trained will never rise higher than the place in which they started. Others will climb step by step to positions of power in radio telephony . . . broadcasting . . . sound pictures . . . aviation radio . . . radio merchandising. And among these will be those who planned years in advance . . . studied, worked, stuck to it.

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Here are a few examples  
of the kind of money  
I train "my boys" to make

### Started with \$5. Now has Own Business



"Can't tell you the feeling of independence N.R.I. has given me. I started in Radio with \$5, purchased a few necessary tools, circulated the business cards you gave me and business picked up to the point where my spare time earnings were my largest income. Now I am in business for myself. I have made a very profitable living in work that is play."

HOWARD HODGSON,  
512 So. Sixth St., Laramie, Wyo.

### Made \$700 in 5 Months Spare Time

"Although I have had little time to devote to Radio, my spare time earnings for five months after graduation were approximately \$700 on Radio sales, service and repairs. I owe this extra money to your help and interest. Thanks for the interest shown me during the time I studied and since graduation."

CHARLES W. LINSEY,  
537 Elati St., Denver, Colo.



### \$7396 Business in two and one-half Months

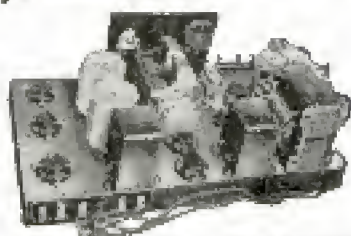


"I have opened an exclusive Radio sales and repair shop. My receipts for September were \$2332.16—for October, \$2087.77 and for the first half of November, \$2176.32. My gross receipts for the two and one-half months I have been in business have been \$7396.25. If I can net about 20% this will mean a profit of about \$1500 to me."

JOHN F. KIRK,  
1514 No. Main St., Spencer, Iowa.



Rear view of 5-tube Screen Grid Tuned Radio frequency set—one of many circuits you can build



**You'll get practical Radio Experience  
with my new 8 Outfits of Parts that I'll  
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My course is not all theory. You use the 8 Outfits I'll give you, in easily working out the principles, diagrams and circuits used in modern sets and taught in my lesson books. This 50-50 method of home training makes learning easy, fascinating, interesting. You get as much practical experience in a few months as the average fellow who hasn't had this training gets in two to four years in the field. You can build over 100 circuits with these parts. You experiment with and build the fundamental circuits used in such sets as Crosley, Atwater-Kent, Eveready, Majestic, Zenith, and many others sold today. You learn how these circuits work, why they work, how they should work, how to make them work.

# I will show You too how to start a spare time or full time Radio Business of Your Own without Capital



J. E. Smith, Pres.,  
National Radio Institute

The world-wide use of receiving sets for home entertainment and the lack of well trained men to sell, install and service them have opened many splendid chances for spare time and full time businesses. Besides Radio's growth is opening hundreds of fine jobs every year. "Rich Rewards in Radio" gives detailed information on these openings. It's FREE.

### So many opportunities many make \$5 to \$30 a week extra while learning

Many of the ten million sets now in use are only 25% to 40% efficient. The day you enroll I will show you how to do ten jobs common in most every neighborhood that you can do in your spare time for extra money. I will show you the plans and ideas that are making as high as \$200 to \$1,000 for others while taking my course. G. W. Page, 107 Raleigh Apts., Nashville, Tenn., writes: "I made \$935 in my spare time while taking your course."

### Many \$50, \$60 and \$75 a week jobs opening in Radio every year

Broadcasting stations use engineers, operators, station managers, and pay \$1,800 to \$5,000 a year. Radio manufacturers continually need testers, inspectors, foremen, engineers, service men, and buyers for jobs paying up to \$15,000 a year. Shipping companies use hundreds of operators, given them world-wide travel at practically no expense and pay \$85 to \$200 a month. Radio dealers and jobbers are continually on the lookout for good service men, salesmen, buyers, managers, and pay \$30 to \$100 a week. Talking Movies pay as much as \$75 to

\$200 a week to the right men with Radio training. My book tells you of other opportunities in Radio.

### I will train you at home in your spare time

Hold your job until you're ready for another. Give me only part of your spare time. Hundreds have won success through my course. J. A. Vaughn jumped from \$35 to \$100 a week. E. E. Wiersma seldom makes under \$100 a week now. The National Radio Institute is the Pioneer and World's Largest organization devoted exclusively to training men and young men for good jobs in the Radio industry by correspondence.

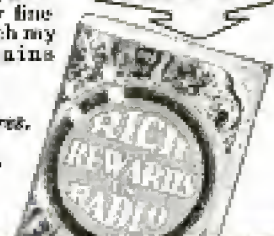
### You must be satisfied

I will refund every penny of your money if you are not satisfied with my Lessons and Instruction Service when you complete, I'll not only give you thorough training in Radio principles, practical experience in building and servicing sets, but also train you in Talking Movies, give you home experiments in Television, cover thoroughly the latest features in sets such as A. C. and Screen Grid.

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It points out  
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Offers You



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Occupation.....

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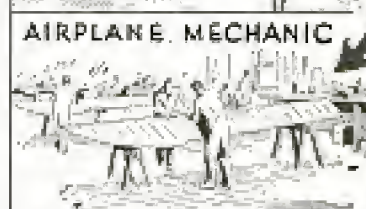
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Poor Lois! The whole roomful of people sitting around, bored, hardly knowing what to do with themselves.

"Oh, Jack," she told me, "I'm nearly sick. Everybody is having a terrible time. We can't dance or anything."

"Well," I offered, gathering my courage, "I'll play for them to dance."

"You!" she exclaimed. "Why, you can't play, Jack. It's awfully sweet of you, but..."

"Watch me," I said. I faced the room and called out: "Folks, I'm going to play."

There was a chorus of good-humored hooting.

"Did anybody else hear what I did?" Ed laughed.

"Jack's a magician," Bill announced. "It's all done with mirrors."

I played up to the frenetic mood, swept my hand over my hair and made a few grotesque flourishes. There was a gale of laughter.

Suddenly I swung into the joyous notes of "Happy Days." This was real playing, and sud-

denly the laughter ceased. At last I felt the thrill of being able to entertain, of contributing to the party.

When I stopped there was a moment of silence, and then I was deluged with questions. "When had I learned to play? Where had I studied? Who was my teacher? Where had I been hiding my talent all these years?"

## How I Learned to Play

I told them the whole story, how I had always longed to be able to play the piano but had never had the patience to sit down for hours and practice. Besides I could not have afforded to pay a private teacher.

But one day, while looking through a magazine, I saw an advertisement of the U. S. School of Music. The ad offered to send a Free Demonstration Lesson to prove how easy it is to learn to play at home, without a teacher, in one's spare time.

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They could hardly believe me. But in a few minutes they begged me to play more, and everyone danced. Lois was

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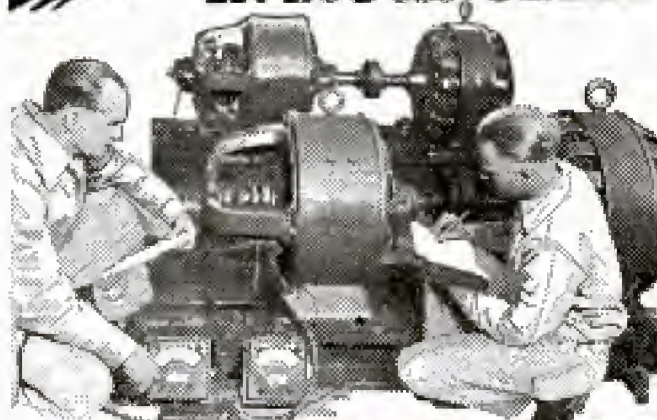
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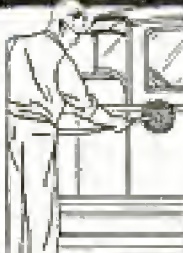
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**STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, of Popular Mechanics Magazine, published weekly at Chicago, Ill., for April 3, 1931.**

**Name of Periodical:** County of Cook, Ill.  
Belmont, Ill. (where published) and for the state and country aforesaid, generally accepted by the Editor, J. H. Windsor, Jr., who, having been duly sworn according to the oath and sworn that he is the editor and business manager of the Popular Mechanics Magazine and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Penal Laws and Regulations, printed on the reverse of this form, to wit: First. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Popular Mechanics Co., 250 East Ontario St., Chicago, Ill. Editor, J. H. Windsor, Jr., 200 East Ontario St., Chicago, Ill. Managing Editor, L. R. Webster, 200 East Ontario St., Chicago, Ill. Business Manager, J. H. Windsor, Jr., 200 East Ontario St., Chicago, Ill. Second. That the owner is: (1) owned by a corporation. Its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given. Typeset by Mechanics Company, 200 East Ontario St., Chicago, Ill. L. R. Webster, 200 East Ontario St., Chicago, Ill. J. H. Windsor, Jr., 200 East Ontario St., Chicago, Ill. Third. That the known bondholders, mortgagees, and other security holders owning or holding one per cent or more of total amount of bonds, mortgages, or other securities are: If there are none, so stated. None. Fourth. That the two paragraphs next showing the names of the owners, stockholders, and security holders, if any, contains not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholders or security holders appear upon the books of the company or transfer or in any other fiduciary position, the name of the person or corporation for whom such books are kept, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of bona fide owners; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him. J. H. WINDSOR, Jr., Editor and Publisher. Sworn to and subscribed before me this 25th day of March, 1931. J. GRAHAM, Notary Public. (My commission expires June 15, 1932.)

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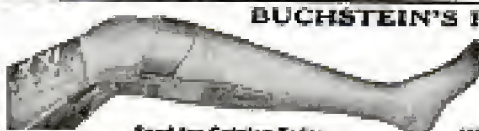
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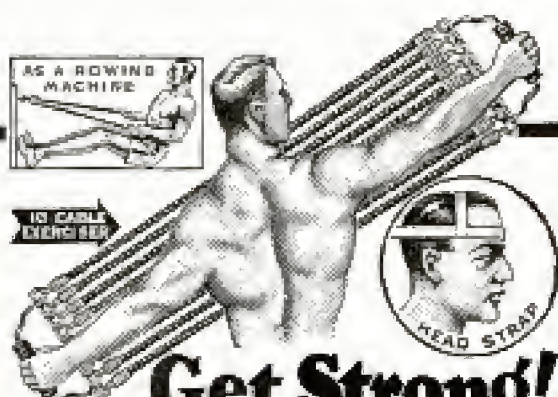
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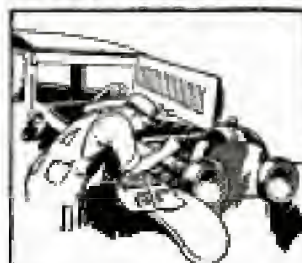
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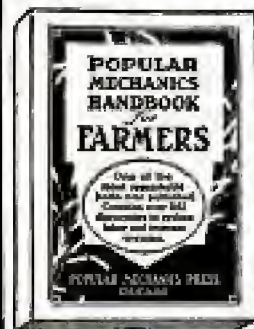
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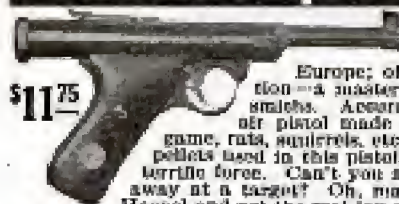
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**UNEMPLOYED?** Thirty companies want agents. Addresses free. Neil Tasker, Shamokin, Penn.

**THANLY** Formulas produce perfect results. All lines. Catalog free. B. Thanly Co., Washington, D. C.

**SUCCEED** With your own products. Make-sell them yourself. Formulas, processes, trade-secrets. Expert analytical service. Catalog free. B. Thanly Co., Washington, D. C.

**WHAT** To invent—Names of manufacturers and wanted inventions sent free on request. Write W. T. Greene, 915 Raylister Building, Washington, D. C.

**THE** Cream of money making plans shows you how to be your own boss in your own business. You owe it to yourself and family. Write now for free details. Ray Sparks Studios, 2001 So. Mansfield Ave., Los Angeles, Calif.

**SHARPEN** Lawn mowers. Complete supplies and instructions \$2. Money back guarantee. John Schallert, 4505 N. Merrimac, Chicago.

**AMAZING** Patented envelope sealer. Seals 30 minute. Refills \$1.50 only. Offices buy on sight. Tremendous market. Free trial. Refills, 3002 Wingham Circle, Boston.

**PERNITE** Refinishing, painting. Start your shop on nearly nothing; mostly all profit. John Brandland, 1139 So. Ninth, Philadelphia, Pa.

**MAIL** Order business is your opportunity. Start small, grow big. Expect of thirty years experience helps you. Free offer. J. Brenner, 227 South 21st, Philadelphia.

**ELECTRIC** Lawn mower sharpeners. Shop profit \$2.00. Central Tool Works, 6911 Ave. C, Houston, Texas.

**CONCRETE** Building block manufacturing is your home town opportunity. Particulars free. Concrete Machine Co., 5 Main St., St. Louis, Mo.

**BECOME** Independent with the Pyramid Money-Making Plan. Start with one dollar, and earn! Circular free. Wright Service Company, 320 Madison Ave., Paterson, New Jersey.

**A SINGLE** dollar is all you need to make money day by day with this new patent. Write for amazing details free. John Meenan, 5901 Brooklyn, Kansas City, Missouri.

**SELECTED** Money making opportunities. Descriptive circulars 4c. Ontario Veterinary, Maryland, Louisiana.

**BUILD** Superior automobile batteries, at home. Manufacturing bulletin 20c. "Malab," 2158 N. Albany, Ave., Chicago.

**NEW** Ideas, inventions, organized and financed. 534 Cuyler Bldg., Denver, Colo.

**SELL** By mail. Books, pamphlets, bag-in-Large profits. Particulars free. R. Ellico, 525 S. Dearborn, Chicago.

**OWN** Your business. Successful plans, profitable spare time. Merchandisers, Box 113, South Pasadena, Calif.

**PARTNER**—Advertising ability, experience, means. Promote amazing discovery; grow hair any head. Fortune right party. No triflers answered. References exchanged. 113 O St., Cottage Grove, Oregon.

**SNAPPY** New money maker. Get free particulars and judge it. Proved, tested, positive winner. Elwood Co., P-1 83 River-st., Paterson, N. J.

**MAKE** Money manufacturing building material. Marble, Granite, Fireproof Paint, Flooring, Roofing. No machinery, cheap; big profits; formulas, latest methods. Wm. Lang, 1114 Washington, Portland, Ore.

**TIM** Counts in applying for patents. See pages 170 and 171. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

**WE** Start you in business, furnishing everything. Men and women, earn \$10 to \$100 weekly operating our original "New System Specialty Candy Factory." Begin home spare time. Unlimited opportunity. Valuable booklet free. W. Hilary Riggsdale, Denver 4, East Ormonde, N. J.

**ARTIFICIAL** Marble sanitary flooring. Instructions covering wood or cement floors, 1/2 inch thick, fireproof, all colors, low cost. Ornamental casting, concrete plaster, papier-mache decorations, garden furniture, statuary, flexible molds, particulars and illustrations free. Chris. Mahler, Elmont, N. Y.

**LEARN** The collection business. Good income, quick results. Interesting booklet, "Skillful Collecting" free. National Collectors Assn., Long St., Newark, Ohio.

**MAKE** Unpatented signs. Patented process. Artistic ability unnecessary. One order cleared \$500. Particulars, Merritts Signs, So. Berkeley, Calif.

**TOYMAKERS**—Complete blueprints of seven popular toys. 30c. Washo-Uru, 314 44th, Detroit, Mich.

**FREE** Book. Start your own little business anywhere selling novelties by mail. My beginner's outfit contains everything required: novelties, circulars, instructions, etc. Descriptive book free. Haddell, 33A-74 Cortland St., New York.

**A BUSINESS** Of your own making—Sparkling Glass Name and Number plates. Motherboards, signs. Big book and sample free. E. Palmer, 340, Wooster, Ohio.

**CAPITAL**—For eggs, the "Promoters' Hand Book," a leaflet on financing; an eye opener for capital seekers. Send \$1.00 to Amster Leonard, East Orange, N. J.

**AMATEUR** Cartomancers. Sell your work. Write Smith's Service, PW1194, Wenatchee, Wash.

**OPERATE** Chain of vending and amusement machines. Be independent for life. Start small, grow big. P. Goodbody, 1820 East Main Street, Rochester, N. Y.

**START** Your own business. Buying discarded old gold, silver and platinum jewelry. Most secret and profitable in the world. Write W. Palmer, Box 81-A, Chicago, Illinois.

**AMATEUR** Cartomancers—Earn \$25.00 week, spare time, copying cartoons for Advertisers. 3-10m Synchro, Acropolis, Wisc.

**"400 THINGS"**—Money making ideas! plans. Opportunities. Three months 25¢. Year \$1.00 with 320 pages popular novel free. "400 Things Magazine," 724 Advance Bldg., Cleveland, Ohio.

**FIFTY** Successful mail-order propositions. Address, K. Home, 2919 Metropolitan, Chicago.

**POPPORN** Machines, crispette outfits. Northside Co., 1306 Fifth, Des Moines, Iowa.

**SELL** By mail successfully? I show you how. Handsome folder free; stamp appreciated. Husler, Box 205-A, Sta. A., Canton, Ohio.

**CHEMICAL** Expert with formulae and trade secrets. All lines. Lists free. W. L. Cummings, P.O. 228 Gordon Ave., Fairbairn, N. Y.

**CHARTERS**—Delaware; best, cheapest; free forms. Colonial Charter Co., Wilmington, Del.

**MAKE** Your own products. Employ agents yourself. Tablet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1950 W. Broad, Richmond, Va.

**I MADE** \$30 a week home. French breadmaking. 15 years' experience; free booklet tells. Ashbrook 67, Marengo, Ohio.

**BUY** Money at home plating auto parts, refiners, silvers, chandeliers; by new method; experience unnecessary. Outfits furnished. Gunmetal Co., Ave. N, Decatur, Ill.

**FREE** Booklet describes 87 plans for making \$20-\$100 weekly in home or office business of your own. Ellis Co., 24 Elizabeth St., New York.

**UNUSUAL**—Uncommon specialties always sell best. Make them yourself from Miller's guaranteed formulas. Why work for others when others can be working for you? Latest eye-opening literature brings you many specialty propositions for you an independent business. Miller Chemical, 700-K Chemical Bldg., Tampa, Fla.

**A Business** of your own. New book of plans, formulas, etc., \$1.00 postpaid. Circular free. Joseph H. Reifort, 4012 N. Kedzie Ave., Chicago, Ill.

## CHEMISTRY

**YOUR** Chemical problem solved and formula or process furnished for Five dollars. Write me. W. Steadman Richards, Industrial Chemist, Box 2402, Boston, Mass.

**BECOME** Trained chemist. Thousands of opportunities—fascinating career. Learn at home. Complete experimental laboratory outfit given. Write for big free book. Chemical Institute, 19 Park Place, Dept. P-621, New York.

**BIG** Money in manufacturing. Easily made, quick demonstrating formulas, with long profits. Analysis. Ideas developed. Associated Chemists, Indianapolis, Indiana.

**CATALOG** listing 2,500 illustrations chemical supplies, 3,000 chemical, 1,000 scientific books sent for 5c. Laboratory Materials Company, 443 E. 71st St., Chicago, Ill.

**FIREWORKS**—Instructions for making all kinds, 35c. Tampa's 55 W. 100th Place, Chicago.

## FORMULAS AND TRADE SECRETS

**FREE** Formula catalog, describing all lines. Western Chemical, Falcon, Oregon.

**POWDER** Automobile polish. Wonderful demonstrator. Formula 50c. All formulas 50c. Catalog free. T. Hoffman, Room 305, 1518 Wilson, Chicago.



**MIRRORS** Made with gold or silver. Can be used for floor glass signs. Plates glass in 20 minutes in a warm room. Up-to-date. Guaranteed. Full instructions with both formulas \$18.00. Nashville Mirror & Sign Co., 414 Commerce St., Nashville, Tenn.

**FIFTY** Money making formulas and sales plan. 50c. Argus 47, Culver City, Calif.

**CEDAR** Polish for autos and furniture. Big profit. Formula, directions, where to obtain supplies. \$1.00 with order. E. G. McDaniel, 1400 Texas.

**SUCCESS** With your own products. Make-sell them yourself. Formulas, processes, trade-secrets. Expert analytical service. Catalog free. B. Thaxby Co., Washington, D. C.

**SECRET** Formula: old fashioned Southern Barbecue, and Mexican Chili Recipe. Big money maker. Each \$1.00. Bobs Southern Barbecue, Delray Beach, Fla.

**FORMULAS** \$1 Each. Analysis and match sample \$1. to \$5. Catalogue free. David Bros., 200 North Jefferson St., Chicago.

**SUPERIOR** Formula: complete manufacturing information for automobile batteries, particulars free. "Molab," 2433 N. Albany Ave., Chicago.

**FORMULAS** From experienced chemist makes better and more profitable products. Information free. Buskett, Joplin, Mo.

**FOOTBALLS** All kinds. Catalog free. Clover Laboratories (P.), Park Ridge, Ill.

**NEWEST** Formulas. Tested guaranteed. Catalog free. Imperial Laboratories, Edinburg, Ill.

**FREE** Formulas—Free materials making \$52.00 worth of guaranteed highest class specialty-necessities. Thirty-three unequalled anticars and other explains all. Miller, Chemist, 1267-G Jetton, Tampa, Fla.

**AND** **FOOTBALLS** And big illustrated catalog 25c. Ideal Book Shop, Park Ridge, Ill.

**MAKE** Your own products. Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1950W, Broad, Richmond, Va.

**15,000 PROFIT** Making formulas. Polishing and many others: Accidents and emergencies, agriculture, silos and amalgams, artist's materials, beverages, cement, glues, pastes, varnishes, bleaching, renovating, coloring metals, drying glass, heat treatment of metals, household formulas, ice cream, confectionery, cleaning gum, laundry work, exterminating vermin, lubricants, paints, varnishes, photography, condiments, canning formulas, rubber, soap, candles, soldering, toilet preparations, perfumes, waterproofing, fireproofing, writing materials. Just write for "Scientific American Encyclopedia of Formulas." When postman hands you book pay \$3.50 and postal charges. Popular Mechanics Press, Room 802, 209 E. Ontario St., Chicago, Ill.

#### AGENTS WANTED

**WOULD** You like the exclusive sale of a product that sold last year heads were shipped to agents last summer? Our beautiful large new package of Crescent Soft Drink Powder is the product. Makes 10 big glasses 10c. The most delicious drinks you ever tasted. Just add cold water and sugar—ready instantly. Also delicious Sherbet by adding milk and freezing. Used with soda makes 20c. Fine for cake icing and candy. Sell stores, also retail if you wish—big profits—sure repeater. Send 25c for three packages, assorted flavors and particulars postpaid. Territory being given now—its very valuable. Don't miss this. Charles Merchandise Co., 4417-25 Madison St., Chicago, Ill.

**EVERY** CoCoCo \$1.75 for you. A "knock-out" instant selling hit! The CoCoCo Auto Horn (patented) sells itself at \$1.00. Going like wildfire in Hollywood. Some agents making as high as \$25 an hour. This horn sells 5 others. No house to house selling—stand around gazes and service stations—CoCoCo and clean up. Installed by anyone in 3 minutes. Send \$2.25 for sample horn. Write for further information. Pacific Coast Products Co., Ltd., 1513 N. Wilcox, Dept. 10, Hollywood, Calif.

**NEONITE!** 500% Profit! Gold and colored glass letters for store windows, trucks, signs. Chameleons store signs. Emblems, monograms. Exclusive territory. Neonite, Akron, Ohio.

**AGENTS** Wanted (men or women) to sell men's neckwear direct to consumer. Max Forchheimer, 315 Seventh Ave., New York City.

**IF** You have ever seen an automatic lawn mower shaver and shaver—don't answer this! If not, send \$1.00 for sample with complete details regarding exclusive territory. Simply give width of your mower. This amazing new, fast-selling invention shavers and oils as it moves. Get started at once! Big profits for agents now. Miracle Manufacturing Company, Youngstown, Ohio.

**BIG** Profits selling food products, motor oil, paint, stock minerals. Sample case free. Lovell & Brown, 1602-P So. State, Chicago.

**AGENTS**—Fast selling moth cake: lasts 10 years, protects furs, clothing, carpets, etc. profits. Send for rebate coupon and sample offer. J. Ferguson, P. O. Building, Turkehoe, New York.

**SELL** New window sign letter. Free samples. Kardon, 1221 S. Spaulding, Chicago.

**AGENTS**—Something new! Make old style clocks into electric clocks. Anyone can attach. Low price. Free details. Hestover Clock Co., 4119-P Irving Park, Chicago.

**"OPPORTUNITY"** For you "booklet and copy of "Mail Order Selling" magazine, free. Prout, Brookfield, Ill.

**NEW** Vest pocket adding machine—Add 20 figures like \$100 machines—costs only \$2.50. Lightning fast. Guaranteed accurate. Sell on sight to stores, stores, homes—all who use figures. More than half profit. Write today for free sample offer and full details. Cleary, 303 West Monroe, Chicago, Dept. 44.

**LIVE** Agents—streetmen: Patented automobile ornaments. It's new. Sell on sight. Guerra Mfg., 391 Manhattan Ave., Brooklyn, N. Y.

**THAXBY** Formulas produce perfect products. All lines. Catalog free. B. Thaxby Co., Washington, D. C.

**AGENTS** For handkerchiefs: original powdered handkerchiefs. Approved Good-Housekeeping. Ever-ready customer. Fine opportunity for hunter. Sample free. Solar Products, J-2144 So. Troy, Chicago.

**START** Your own business. We supply outstanding values ladies' hosiery, lingerie, men's shirts. Free catalogue guide. Putnam-Jones, 602 Washington St., Boston, Mass.

**GIVE** Away the pound quality coffee with dollar sale Midwest Products. Pure 100% profit. 30 days' credit given reliable workers. Midwest Drug Co., Dept. 121, Columbus, Ohio.

**NEW** Rubber goods line, 47 money makers. Rubber cups, cushions, bath seats, rubbercoats, rubber soles, aprons, baby goods, etc. Big profits. Best values. Direct from Akron, the rubber city. Make up to \$20 weekly. Credit given. Write for catalog and free outfit offer. Krister Mfg. Co., 1130 Bar St., Akron, Ohio.

**"BUCK TRUCK"** Automobile dry cleaning and polishing cloth, washes and polishes tires, automobile finishes in one simple operation. Exceptional sales and profit. Sample free. Other attractive items. Walter S. Bus & Co., Kent, Ohio.

**POLISHING** China made to your specifications under your own label. All kinds. Write for quotation. Walter S. Bus & Co., Dept. P, Kent, Ohio.

**SELL** To stores, carded products; 20 different items. Write for free illustrated catalogue. Metro Specialty Co., 9 West Pearl Street, Cincinnati, Ohio.

**NEW** Electric flashing sign just out—chameleons letters. Beautiful Neon color effect. Three sizes and styles. Unbreakable. Guaranteed. Every merchant buys on sight. 100% profit. Protected territory. Preston Mfg. Co., Dept. P-8, St. Louis, Mo.

**NEW** Profit sharing plan—150% profit, \$75 to \$200 weekly. Soap, extracts, toilet articles, food products, etc. Free sample case. Experience unnecessary. Carnation Company, Dept. 644, St. Louis, Missouri.

**MAKE** Your own products. Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1950W Broad, Richmond, Va.

**START** Your own business. 50 profitable items, hat sellers, etc. Write for details. Tilly, 2222 East 17 St., Brooklyn, N. Y.

**EXTRA** Money—selling beautiful costume jewel earrings for bird cages, to your friends. Send 75c for sample. Sells for \$1.25. Roswell Novelty Co., Wayshu Press Bldg., Los Angeles.

**SUCCESS** With your own products. Make-sell them yourself. Formulas, processes, trade-secrets, expert analytical service. Catalog free. B. Thaxby Co., Washington, D. C.

**THIS** is so good; it's foolish to call it selling. All you have to do is show my magic sales outfit, repeat 4 magic words and collect your commission. Write for this now. It's free. Dept. K-6, Rogers, 1237 Broadway, New York.

**WANTED** Reliable, energetic men to supply famous Watkins products to satisfied customers. 150 household necessities favorably known everywhere. Earnings \$35 to \$100 weekly. Write at once, J. R. Watkins Company, Dept. PM631, Winona, Minnesota.

**LIGHTNING** Window cleaner. Better to use. Easier to sell. Over 100% profit. Unlimited demand. Write for agents proposition. Felt Products Co., 815 E. 90th, Seattle, Wash.

**SELL** Stereos 5c carded breathlets, etc. Leeger Products, Albany, N. Y.

**MAKE** Money—Your own business. Valuable formulas. Free information sent. Arthur Terry, 1818 W. 1, Brooklyn, N. Y.

**10,000 MEN** And women wanted to sell our specialties for automobiles, sportsmen, homes, etc. Will give permanent employment and exclusive territory to persons producing results. Liberal commission. Write for complete information. We are reliable and responsible. Our representations guaranteed. W. A. Gibbs & Son, 9 Jeffrey St., Chester, Pa.

**AGENTS**—Delicious soft drink in concentrated form! Each 25c bottle makes 22 glasses. Eight popular flavors. Tremendous demand. Wonderful chance to make \$15 profit a day. Particulars free. Albert Mills, 9131 Monmouth, Cincinnati, O.

**MIRRORS** Redwood at home. Costs near 5 cents per square foot; you charge 25 cents. Profitable business plating auto parts, reflectors, tailwires, stores, refinishing metalware, etc. Outfits furnished. Details free. Write. Speake, Plater, 128, Marion, Ind.

**THIS** is so good; it's foolish to call it selling. All you have to do is show my magic sales outfit, repeat 4 magic words and collect your commission. Write for this now. It's free. Dept. L-4, Rogers, 1237 Broadway, New York.

**SELL** New type double edge razor blades. Specialty Mfg., 1218 South Broadway, Los Angeles, Calif.

**SALERSMEN**—Gentleman's Vest-pocket manicure toilet set. Something new. Sensational. Sample \$1.25. Phoenix Specialties Company, 7 East 12nd Street, New York.

**NEW** Neon sign invented—Dazzling new display sign, genuine Neon; beats \$500 signs; sells for only few dollars; vivid colors; changeable letters, flashing lights; sensation. Distributors and salesmen wanted. Wire or write, Preston Mfg. Co., Dept. N-13, St. Louis, Mo.

**100% PROFIT**. Whirlwind seller. Sensational Nullette cloth, cleans, polishes, all metals without liquid, paste, powder. Good Housekeeping tested, approved. Free sample. Shelf D Mfg. Co., Weymouth, N. J.

**BIG** Money easy, simply showing new Polly Wrench. 10 wrenches in one. Guaranteed fast seller. Sample furnished. Gellman Mfg. Co., Dept. G-P, Rock Island, Ill.

**AGENTS**—100% profit on \$1.00 sale. Cleaner for autos, furniture, metal and glass. Your name on labels. Exclusive territory. Free sample. Write Minute-Kleen Laboratories, Dept. K, Evansville, Ind.

**REFLECT** Heavy wear-off automobile parts, reflectors, bath room fixtures, wood spoons, forks, etc., with pure silver. Looks like new. Use U-Kan-Plate Polish. Postpaid. Satisfaction guaranteed. Agents wanted. Dept. A, U-Kan-Plate Co., Philadelphia.

**EXCELLENT** Trouser presser \$1.25. Agents 24c. Wonderful necktie stretcher 10c. Agents 50c dozen. Widness, 401 Summer Ave., Brooklyn, N. Y.

**BIG** Seller new cheap auto novelty, also vintage brooch. Hummer brand new knock-out. Under Supply, Station C, Chicago.

**U-Kan** Commission, automobile novelty, Randall Metal Works, Union City, Mich.

**PORTRAIT** Men—Big profit catalog. Guaranteed portraits, frames, medallions, photo pillows, household specialties, toilet preparations, food products, remedies, pictures, etc. James Bailey Co., Station C-5, Chicago.

**ABSOLUTELY** Brand new. Hand-colored popular priced portrait coloring kit. Everyone wants them. Make \$10-\$25 daily. Samples furnished. Cruser, 2462-FS Jackson, Chicago.

**NOVEL** Pearl and cigar lighter combination. See ad page 110.



**ELECTRIC** Water heater—New. Heats water instantly. Pocket size—retails \$5.75. Two minute demonstration makes you \$1.85 profit. Lux-Vibol, Dept. 67, Elkhart, Ind.

**100% PROFIT** In new mystery night lighter. No flint or friction. What makes it light? No wind can blow it out. Retails 50c. Sample and sales plan 25c. New Method Manufacturing Co., Box P31-6, Bradford, Pa.

**300% PROFIT** In new "20-in-1" kitchen necessity. Details 25c. Costs you \$1.00 a dozen. \$10.00 a gross. Sample 15c to cover cost of mailing. New Method Co., No-Method Bldg., Desk P31-6, Bradford, Pa.

**300% PROFIT** Selling Mystery Gas Lighter. Details 25c. Costs you \$1.00 a dozen. Sample free. Square Deal Mfg., Desk PM-20, Bradford, Pa.

**HERE'S** the biggest money-maker in years. Just show samples, collect big cash commissions. Everyone buys Longwear's sensational value, work pants, dress pants, breeches, overalls. Big selection. Free sales outfit. Write today. Dept. P-6, Longwear Trousers Co., 499 Browne St., New York.

**HIG** Money daily selling shirts, ties, underwear, etc. pajamas, belts, professional uniforms, raincoats, coveralls, pants, children's play suits. Outfit free. Experience unnecessary. Almond Co., Dept. 6, 4922-23 Lincoln Ave., Chicago.

**GUARANTEED** Hosiery—lowest mill prices, men's latest fancy hose—doz. \$1.40-\$1.75. Ladies' silk hosiery—doz. \$1.25-\$1.75. Catalogue free. Superior Knitting Company, Dept. 34, New Haven, Conn.

**NEW**, Profitable—Sell auto step mats. Quilting rubber with owner's name imbedded white. Details free. Elmo Products, Dept. B-40, 895 Main, Akron, Ohio.

**CASH** Paid for buttonholes, insects. See Single Display Advertisement on page 10.

**TIME** Counts in applying for patents. See pages 120 and 121. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

**JUST** Invented—new washing machine. No motors or moving parts. Automatically cleans entire washing. Fully guaranteed. Retail price \$9.50. Your profit 100%. Protected territory. Precision Mfg. Co., Dept. W-8, St. Louis, Mo.

**MAKE** Your own products. Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1950W Broad, Richmond, Va.

**AGENTS** big money handling our specialties. 100% profit. Sample 25c. Webster, 743 Wellington Ave., Chicago.

**SELL** Our real metal face changeable letter signs. Retail at \$2.00. Absolutely new. Over 250% profit. In demand by every store. Write for details. U. S. Finishing Co., 771 W. Jackson Blvd., Chicago.

**250,000 ARTICLES** Wholesale—Directory 10c. W. Patterson, 4111 University, Des Moines, Iowa.

**ASTOUNDING** New razor blade sharpener. Costs you 5c, sells 50c. Follow the plan for manufacturing secret, marketing instructions. Francis Sales, Dept. D-8, 125 East 170th St., New York City.

**AMAZING** Secret formula teatle mist sprays windshields, windows clean instantly; absolutely new \$1 seller; repeat sales; colored signs furnished. Exclusive territory open. Write quick. Magic Mist, Dept. 100, 1051 E. 76th Place, Chicago.

**"BAXI-WOOL"** New wonder household necessity. Agents cleaning up. Amazing results. 25c seller, 100% profit. Sample free. Air-Steam Co., C-132 W. Lake, Chicago.

**200% TO 600% PROFIT**. New Invention. Crest Collar Layrite keeps soft collars flat. Eliminates wrinkles. Every man buys. \$50 weekly cash. No competitors. Write for proposition. Send 25c for sample. Crest, 229 Van Buren, Dept. C-73, Chicago.

**ADDRESSES**—Hundreds of wholesale and agent supply houses. Particulars free. J. Heffert, 4042 N. Kedzie Ave., Chicago, Ill.

**NAPHTHOL** Polishes silver without rubbing or work. Guaranteed unbreakable. Enormous demand. Big profit. Repeats. Naphthol, 1829-33 Lauderdale Ave., Cleveland.

**INVENTOR** Discovers "electric light wizard". Saves material up to \$100 yearly. One minute installation without tools. Pays for self first week. Write for details. Research Mfg., Dept. P31, Peoria, Illinois.

**STRANGE** Insulating cord. Prevents searching. Saves electricity. Abolishes kinks, snags. Approved by Good Housekeeping. For telephones also. 200% profit. Samples furnished. Neverknot, Dept. 6-A, 4303 Ravenswood, Chicago.

**SALESMEN** and Saleswomen—Get the Carnation line; new official proposition; the biggest household sellers ever gotten out; send for samples; get started now: \$200 to \$500 weekly; every household wants to buy; sells everywhere on sight; auto household producers; exclusive territory. 150% profit. Carnation Co., 615 St. Louis, Missouri.

**MODERNISTIC** Windowpanes valances create rich colored glass effects for stereo fronts at low cost. Every retailer a prospect. Large profits in selling and supplying. V. P. Malz, 11 N. 10th St., New York.

**SOMETHING NEW**—Different. Every home prospect. 300% profit. Sample free. Salesmanager, 5th floor, 429 Superior, Desk 10, Chicago.

**MAGNETO**, World's best polishing cloth. For all metals. Easy sales; 300% profit. Sample free. Maple Mfg. Co., 2717 Summit, Kansas City, Mo.

**QUICK** Money in our 15-cent neckties. Salary of commission. Data free. Lustrous Fine Fabrics, Jersey, N.J.

**STEP** into big money with work clothes. Every man needs pants, breeches, corporals. Longwear's 4 complete lines sell on sight. Cash in your pocket every day. Sell free with every 2. Complete outfit free. Dept. P-6, Longwear, 489 Browne St., New York.

**IMPORT** Your own goods. German export magazine published in English offers numerous bargains latest novelties; opportunity for obtaining profitable agencies. Copy 60c. Square Deal Supply, P-246 Fifth Ave., New York.

**\$6.00 PROFITS** For five minutes of easy selling. Sales experience unnecessary. Each demonstration means a sale. Every smoker a live prospect. Chesterfield Sales, 65 East Fourteenth, Chicago.

**ADDING** Pinell. Amazing new invention. Sells like wildfire. Agents wanted everywhere. Get sample immediately. Add-U-Graah Co., Dept. 27, Saitliffe, Miss.

**POSTAL** Brings details of winning combination! Samples 50c. Lullins, Abbott, Ark.

**THIS** Advertisement may make you thousands of dollars, if you write immediately for my "Eye-Opening" literature describing guaranteed formulas; valuable trade processes; money-making information how to easily make the world's best-selling specialties. All lines. Investment small. Profits immense! Start in your home, room or office. Make the good money you're entitled to. Dr. Labouche Miller, Chemist, Tampa, Fla.

**ARE** You old at forty? See our advertisement on page 125 of this issue. The Electro Thermal Company, 2162 Morris Ave., Steubenville, Ohio.

**OH** Hello! What didn't I see this before. Christ's Tea Bag and Chain Remover sells like wildfire. Write for free sample. Christy, Inc., 2007 Union, Newark, New York.

**BUY** 250,000 Articles wholesale. Directory 10c. Arts, Box 18113, Denver.

**START** A lovely little home dress shoppe, and prosper. Write Isabelle Gouss, PM-219 West 21th, N. Y.

**PROFITABLE** Home business. Legitimate. No canvassing. Maynard Publishers, P-923 Broadway, New York.

**CHICAGO** Experts valued 33 stone at \$300. The diamond's only guaranteed rival. Greatest spare time, side-line article ever known! Amulet profits. 25 pocket sample case free. Write quick. Mexican Gem Company, Dept. PM, Monterey, Calif.

**FREE** "Booklet of money making opportunities." New ideas, original plans, money making secrets and other valuable information. None require peddling or outfit. Elito Co., 84 Elizabeth St., New York.

**"CEDARATOR"** Household necessity. \$12.00 daily. Full-sized sample, \$1.50. Nell Tashner, Shamokin, Pa.

**35 CHRISTMAS** Cards quickest seller, profit 51%. Sample \$1.00. Talbot, Hager Avenue, Buffalo, N. Y.

**HIG** Profits selling new, marvelous auto speed polish. Cleans, polishes like magic. Easily demonstrated. Fast sales. Full size sample 25c. E-B Mfg. Co., Bethlehem, Pa.

**"WHAT A Seller"**—It's new—A 100% winner. Punch board. Fashions, agents, operators make \$100 a week. Write, Dept. C, 810 S. Michigan Ave., Chicago.

**SELL** Goodyear raincoats. \$2.05 up. Goodyear Rainwear, 18 West 22nd, New York.

**SELL** 2A Garage door holders, simple, automatic, quickly installed. Interest-free owners, builders, everybody. Exclusive territory proposition. Knowlson-Storvessan 120, Ann Arbor, Mich.

**MAKE** Your own products. Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1950W Broad, Richmond, Va.

**PLAYING** Extracts—Bottle yourself! Labels furnished. 600% profit! Whirlwind money-makers! Repeaters! Free offer. Thomas Manufacturing Company, Indianapolis, Ind.

**SOMETHING** New for unexploited! Make \$10.00 a day in 1-minute photography. No experience necessary. Full particulars free. Benson Camera Company, 154 Bowery, New York.

**CALIFORNIA** Perfumed beads, selling like hot cakes. Agents earning money. Catalog free. Mission Factory, P. 2234W Pico, Los Angeles, Calif.

**SEDLINET** Write Education. Box 25, Beverly, Mass. Samples (enclosed) 25c.

**SELL** Changeable signs to stores. Six lines, costs 30c sells \$1.50. Particulars free. National Sign System, St. Louis, Mo.

**\$40-\$50 A WEEK**. Genuine gold letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 428-B North Clark, Chicago.

**WE** start you without a dollar. Soap, extracts, perfumes, toilet goods. Experience unnecessary. Carnation Co., 611, St. Louis, Mo.

**AGENTS**—Make a dollar an hour. Sell Menders—a patented patch for instantly mending leaks in all utensils. Sample package free. Collette Mfg. Co., Dept. 401, Amsterdam, N. Y.

**PHOTO** Medallion men and women, the largest line of photo novelties in the world. Lowest prices, quickest service. Send for catalog showing over 200 money makers. Gibson Photo Jewelry Co., Inc., 822-827 Grandview Ave., Brooklyn, N. Y.

**NO** Dull times selling food! People must eat. Federal distributors make big money; up to \$2,000 yearly or more. No capital or experience needed; unpaid goods may be returned. We furnish free sample case. License and free samples for customers—sure repeat orders. Exclusive territory. Ask now. Federal Pure Food Co., 2297 Archer, Chicago.

**A BUSINESS** of your own—Making sparkling glass name and number plates, checkbook and signs. Big book and sample free. E. Palmer, 512, Wrenner, Ohio.

**OUR** Luminous crystals and new luminous St. Therese statue shine brilliantly in the dark. Sell on first demonstration. Write for prices. W. G. Hannan Co., 2543 So. State, Chicago.

**HIG** Money applying gold initials on automobiles. Fastest thing today. No experience needed. \$1.45 profit every \$4.50 job. Free samples. "Rales," X-1045 Washington, Boston, Mass.

**NEW** Line Counter Displays, Aspirin, Plints, Chewing Laxative, Breath Gum, No-tartar, Seltzwater, etc. Steady Repeats. Over 100% Profit. Superior Co., W5, Baltimore, Md.

**ENGRAVED** Nameplates, signs, name-plates, initial, desk, etc. nameplates. Big profits. Nelson Engraving, 90 Stewart, Providence, R. I.

**AMAZING** Electric water heater. Fast sale profits. Heats water instantly. Pocket size. Sell fast at \$2.95. Write quick. Bestwater Co., 4517P, Irving Park, Chicago.

**AGENTS**—Clever Invention! Inkspoon makes every pen a fountain pen. Fast office seller; big profit, demand increasing everywhere. Exclusive territory offered. Sample free. H. Marul Company, Tribune Bldg., New York, N. Y.

**FREE** Circulars describing how you can make big money in Mail Order business at home. Arrah Publishers, 1217P, Avenue U., Brooklyn, N. Y.

**LOWER** Prices! Bigger profits! Fast selling soaps, toilet articles, food products, household specialties. Premiums, free deals make sales easy. Write for big surprise offer. M. G. Roth, President, 2729 Dodder, St. Louis, Missouri.

**Genuine** Gold Leaf Letters anyone can put on store windows. Guaranteed to never fade. Large profits. Enormous demand. Free samples. Write today. Metallic Letter Co., 428-B North Clark, Chicago.



**AGENTS—Dealers:** Buy direct at wholesale. Save money. Write Dept. P, United Specialty Co., Smithtown, New York.

**NO-TANGLE** Ironing cord; cannot kink. Saves electricity. Tremendous profits. Sample free to workers. Bestover Co., 706 Irving Park Station, Chicago.

**AGENTS** Everywhere making money with our line of kitchen specialties, demanded in all homes. Big earnings possible. Write today for details. P. Steel Filter Co., 333 Broadway, New York.

**MADE MONEY.** Show mystery metal polishing cloth. Approved by good housekeeping. Send for free sample. Mohler, Omaha, Minn.

**JACQUE** Inspector of neckties offers exclusive agency and entirely new proposition. Enormous demand. No competition. Unlimited possibilities. La Monance, 366 Broadway, New York.

**PIRE—Picture man** Friedman's new cut price 55 page catalog, portraits and frames. Lowest in years. Friedman, 109 West Austin Ave., Chicago.

**AGENTS—Moore** turn and caution remover will build you a steady repeat business. Send today for pocket-size trial outfit. The Moss Company, 101 Seaside Bldg., Rochester, N. Y.

**BIG MONEY** and fast sales. Every owner buys gold initials for his auto. You charge \$1.50; make \$1.45. Ten orders daily easy. Write for particulars and free samples. American Monogram Co., Dept. 49, East Orange, N. J.

**POLMET** Polishing cloth—Removes tarnish from metal without the use of liquid, paste or powder. Agents say it sells like "hot cakes." Retailer 25c. Sample free. Gale Co., Inc., 15 Edinboro St., Boston, Mass.

**MAX** In each town to make auto parts, reflectors, bathroom fixtures, refinish beds, mirrors, chandeliers; by new method. No capital or experience required. Simple plan of manufacturing at home starts you in big money-making business. Outfit furnished. Free particulars and proofs. Gun Metal Co., Atc. H. Decatur, Ill.

**GREATEST Opportunity:** newest proposition. Build continuously growing business in your own name. Household, industrial, brushes, brooms, mops, dusters, fully guaranteed. New catalog, all net prices, no discount to higher with. Make as high as 700 per cent and over. Write today. Wire Grip Sanitary Brush Corp., 41 East 11th St., New York.

**SELL Men's neckwear—wonderful proposition.** Assure M. 39 East 28th, N. Y.

**AGENTS:** Stamping names on pocket-knives protectors. Sample check with your name and address, 25c. Stamping outfit. Emblem checks, check-books, name plates. Matt 256c. Co., Desk 2, 393 Duane St., Brooklyn, N. Y.

**BIG Profit** putting on gold star letters on store windows, without experience. Samples. Consolidated, 69-T West Van Buren, Chicago.

**MANUFACTURER** Wants distributor for new "Pocket Radio," only \$3.85. "Sells itself with music." Pays 100% profit. Spencer Radio, Akron, Ohio.

**AGENTS—Engraved name plates,** sizes, number plates etc., easily sold with large profits. Brett Bros., Wingham, Mass.

#### HIGH-GRADE SALESMEN WANTED

**STOP Working** for small pay—start your own business on our capital; pays better than most occupations; hundreds average \$6,000 annual sales year after year; some established 20 years; many have acquired wealth, homes, farms, cars; we supply stocks, equipment, on credit; some 200 home and farm necessities; nearly 50 million sold 1936; selling experience unnecessary; wonderful opportunity to own pleasant, diversified, profitable business backed by \$17,000,000 world-wide industry; first send for complete information—then decide. Rawleigh Co., Dept. P-N-PPM, Freeport, Ill.

**WANTED—County** salesman with car, to demonstrate for large Ohio manufacturers. First-class job. Fry-Fryer Co., 2176 Fry-Fryer Building, Dayton, Ohio.

**WONDERFUL** invention, sells fifty envelopes minute. Sells on sight at \$2.25. Attractive trial offer. Square deal. Bank references. Kendall Sealer Co., Dept. C-31, East Jaffrey, N. H.

**ONE \$6.75** Order daily means \$140 weekly from original and repeat commissions. A lifetime job. Free ill. Sales Stimulators. Dept. H-H, 341 Madison, Chicago.

**GENUINE Neon—Priced** to sell 40% commission. Buyers want it. Willis Austin, Miami, Okla., made four sales, sold four. Collected \$30.00, three hours work. Doubt if Write him. Every hustler hits with Neonite—the genuine Neon border display with changeable letters and posters. Sizes for all show windows. Also mounted Neon letters. Plug in any A.C. socket. Big money for early birds. Special 30-day demonstrator trial offer. Display Products Co., 469 East 31st, Kansas City, Missouri.

**\$19 TO \$25** Daily; highest selling line of men's suits. Meets present day conditions. Amazing values at \$11.95, \$14.50, \$16.95, \$18.95. Also raincoats, slippers, topcoats and boys' suits. Biggest commission paid to advance. Liberal homes. Free outfit. State size and selling experience. "Jim" Foster, Inc., Dept. 76, 2250 South Spaulding Ave., Chicago.

**ELABORATE** Printing outfit free. Largest assortment specialty items and novelties at half price. Union label. 72 hours delivery. Big commissions advanced. Experience unnecessary. Northwestern 025-P Jackson, Chicago.

**GRAPE Concentrate—Poet, Sherry, Champagne, Claret, etc.** in solid brick form; one brick makes one gallon wine; legally brewed established in courts; government financing industry; every home, hospital, church, grocery, drug store prospect. 100% profit for distributors—salesmen. Yuso Sano Co., Dept. 8-186, 285 3th St., San Francisco, Calif.

**ADVERTISING** Novelty salesmen for new advertising specialty. Liberal commissions in advance. Gils Co., 5421-K Chicago Ave., Chicago.

**\$75.00 WEEKLY** job—Salesmen-Distributors! Outstanding opportunity, amazing new tire patch guaranteed 10,000 miles. Big profits, steady repeats. Protected territory as factory distributor. Write to Kransony Rubber Products Co., 664 Burkhardt, Dayton, Ohio.

**SALESMEN—Mothicide, vacuum cleaner** attachment kills moths. Every home a prospect. Write quick. Mothicide Co., 593 Central Ave., Jersey City, N. J.

**FRENCH Perfumed** business cards sell fast to every business; no competition; immediate profits. Samples free. French Co., 10632 Euclid, Cleveland, Ohio.

**ALL Merchants** buy! 5c corded mats, napkins, etc. Steady repeats. Also bar priced vending machines. Robbins Products, 23 Dorchest Street, Brooklyn, New York.

**WANTED** Representative for big printing concern. No experience necessary. Big pay every day. Beautiful Sales Kit free. Printette, Inc., Dept. 1, Schuon Blvd., Minneapolis, Minn.

**SALESMEN—Wonderful** sideline. 45% commission paid daily. Sells all merchants. Pocket outfit free. David Lionel Press, 312 So. Hamilton, Dept. 213, Chicago.

**PUNCHBOARD** Salesmen—Meet clients fine ever featured. Vending machines—all kinds. Make as high as \$28.00 on single order. Repeat commissions. Beautiful colored catalog free. Lion Mfg., Dept. 8, 283 W. Erie, Chicago.

**AGENCY Organizers—To show** the new gold solder. Needs neither heat nor acid. Dishes, furniture, jewelry, pipes, tanks, radiators, golf clubs. Fluid Solder Products Co., 1115 So. Wabash, Chicago.

**SENSATIONAL** Garage tool, \$180.49 weekly supplying demand. No competition. Demonstrator free. B & G Company, Kenosha, Ill.

**RECORD** Breaking profits selling stores amazing new business stimulator. Low cost. Unusual features. Retailers buy on sight—repeat often. Combsing in advance. Outfit free. General Premium, 65-G East Lake, Chicago.

**SELL** Deluxe aluminum coolers direct. Permanent connection producers. Sensational sales plans. Write or wire, quick. Yates Products Company, Sherrport, Ia.

**AMBITIOUS** Salesmen wanted to sell new salted confection. Nothing like it. Taking country by storm. Tremendous field. Big profits. Virgin territory. Radio Adc. Write Korn Parishes, 363 Field Bldg., Sumner, Ind.

**SALESMAN** Men: whitewash seller. \$15 profit every call. Repeat commissions. Best season. Hurry. Puritan Mfg. Co., 2027-F Charleston, Chicago.

**SALESMEN—100% Profit** on \$1.00 sale. Clearance for autos, furniture, metal and glass. Your name on labels. Extensive territory. Free sample. White, Minto Klem Laboratories, Dept. E, Evansville, Ind.

**BUSINESS Stationery—Largest** line, highest quality. Quickest delivery. Highest commissions. Liberal bonuses. Free copyrighted cuts every business. Experience unnecessary. Instructions and outfit free. Williams Co., Dept. 300, 2120 Gladys Ave., Chicago.

**NEW** And plenty different—Fast selling 5c-10c merchandise on attractive counter cards. 100% commission for you and dealers. Advertised by radio. No capital required. Catalog free. World's Products (Ketch, 1921), 143 Central, Spencer, Ind.

**DISTRICT** Managers to handle new, patented, specialty, to trade through agents, personally. Good for \$500 monthly, repeat. Non-Breaking Button Corp., Milwaukee, Wis.

**WE Want** to hear from full and part time men who can sell complete line of business printing. One of finest in country. Thousands of live cuts. Full cooperation and progressive sales plans. Outfit free. All-Trades, 110 N. 2nd St., Rockford, Ill.

**NEW—Startling—Amazing.** \$10 to \$25 a day easily earned. Home protection \$250 to \$1000. At death. Ages 1 to 30. Not an insurance company but a society furnishing protection at cost. Write National Aid Society, Myers Building, Springfield, Ill.

**NEW Specialty—Sells** every business and professional man. Four \$15 sales daily pay \$30 weekly. Forer cleared \$1920 in three months. Write, P. E. Armstrong, President, Dept. PM, Mobile, Ala.

**ADVERTISING** People sell fast to every business. New, quick cash commission plan. Main or sideline. Free pocket outfit to real salesmen. Chicago Graphite Co., 120 So. Clinton, Chicago.

**NEW** Largest color catalogue, punchboards, vending machines, produces quicker orders, big commissions. Free outfit. Lincoln Sales, 115 So. Wells, Chicago. Dept. D. Established 29 years.

**SALESMEN—Easy** selling De-U-Rat shoe jobbers. 20% commission. Kills nothing but rats and mice. Rick Drug Co., Gallon, Ohio.

**\$60-\$200 A WEEK.** Genuine gold letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 439-A North Clark, Chicago.

**SALESMEN—At last!** New feature sells punchboards everywhere. Dealers will with joy—prosperity back again. Profits enormous. Samples free. Puritan Co., 1407 Jackson Blvd., Chicago.

**BIG Money** daily selling shirts, ties, underwear, socks, pajamas, belts, professional uniforms, raincoats, overalls, pants, children's play suits. Outfit free. Experience unnecessary. Nimrod Co., Dept. 65, 4922-28 Lincoln Ave., Chicago.

**SALESMEN—Become** independent. Own your business; experience unnecessary. Selling our \$10,000 accidental death; \$30 accident; \$25 sick weekly benefits—\$10.00 yearly. Other amounts proportionate. Guaranteed steady income from renewals. \$250,000 deposited insurance department. Universal Seller, Dept. A, 714 LeCompt Bldg., Newark, N. J.

**SELL** Nothing! \$176 weekly empty handed. \$200,000 punchboard firm announces new plan. No investment for anyone. Season starting. Hurry! K&S Sales, 4236 Racine Road, Chicago.

**SALESMEN:** Our men earning \$15-\$40 daily selling to stores. Sizers Systems, Est. 1893, 2813 Sheffield, Chicago.

**BIG Profit** putting on gold sign letters on store windows, without experience. Samples. Consolidated, 69-V West Van Buren, Chicago.

#### HELP WANTED

**IF** You want a wonderful opportunity to make \$15 profit a day and get a new Ford sedan besides, send me your name immediately. No experience necessary. Particulars free. Albert Mills, 9132 Monmouth, Cincinnati, O.

**MEN** With or without car to operate branch offices everywhere and manage rooms. Sales force secured by us through advertising in your local papers. House to house selling campaign. Good pay, experience unnecessary. Year round work. Block Manager, 1160 Chatham Court, Chicago.

**CASH** Paid for butterflies, insects. See Sinclair Display Advertisement on page 16.



**EARN** Up to \$25 or more weekly growing mushrooms for us in your cellar or shed. Illustrated booklet free. American Mushroom Co., Dept. A-8, Toronto, Ont.

#### EDUCATIONAL AND INSTRUCTION

**MEN—Women, 18-35:** \$105.00 to \$280.00 month. U. S. Government life jobs. Steady work. Paid vacations. Common education usually sufficient. Valuable book with list positions, sample coaching and particulars—free. Write immediately—today sure. Franklin Institute, Dept. 193, Rochester, N. Y.

**FIREMEN,** Brakemen, baggage men: colored train or sleeping car masters, \$150—\$250 monthly. Experience not necessary. 310 Railway Instruction Bureau, East St. Louis, Ill.

**DON'T** Be unemployed. Become expert architect window and electric motor repairman, start your own business. In your basement or garage, regulate your wages and working conditions. We instruct you the right way with simple instructions and practical charts. Everything explained in plain non-technical terms you understand. Write for free information today. Handle Bros. Armature Shop, 520 Fourth St., Waukegan, Ill.

**LEARN** Photo-engraving at home by actual experience. Equipment furnished. Write. The Aurora School of Photo Engraving, Box 108, Aurora, Mo.

**EARN** \$140 To \$225 month as postoffice clerk-carrier, rural carrier, railway clerk, steady work; pensions; other advantages. My easy exercises and practice (40 pages) qualify you for all above positions—\$7.40 complete. Booklet free. Chisholm Service, Rockwell, Texas.

**ADDITIONAL** Men and women wanted to earn \$50 to \$200 weekly in fascinating profession. Experience or talent unnecessary. Unlimited field. Steady work. Learn during spare time at home. Big demand for trained men and women painting show cards, posters window signs, etc. Complete practical course, now only \$2. money order or check. Alfred Haydon, Dept. 208, Antwerp, Ohio.

**LEARN** Pipeline welding. Earn \$77 weekly. 2000 welders short last year. 1934 already bigger. National Welding School, 715 Fairfax, Kansas City, Kansas.

**MATHEMATICS** Simplified, easily understood short cuts for beginners from primary arithmetic to Calculus details free. Los Angeles Polytechnic Institute, 1661 Wilshire Blvd., Los Angeles Calif.

**RAPID** Figuring quickly learned. For particulars address Frederick A. Smith, 4748 Virginia Ave., Chicago.

**HOW** To sell, complete course, \$1.00. Vince, 255 Columbia, Minneapolis, Minn.

**PHOTOPLAY** Talking picture and magazine stories wanted for revision, development and copyright. Sell on commission. Established 1917. Booklet free. Universal Scenario Company, 406 Meyer Bldg., Western and Sierra Vista, Hollywood, Calif.

**U. S. GOVERNMENT** Wants men, \$1,700—\$1,900 and up at start. Railway mail clerk examination coming. Let our expert former government examiner prepare you for this and also rural carrier, post office, customs, internal revenue, and other branches. Write today for free booklet. Dept. 3, Patterson School, Rochester, N. Y.

**THE** Art of Cartooning Course for only \$2.98. Particulars free. Carl Anderson School, Madison, Wis.

**BECOME** A landscape architect. Uncrowded profession; wonderful opportunity for money-making. Easily mastered by mail. Earn while you learn. Oct. 1916. Write for details. American Landscape School, 294 Plymouth Bldg., Des Moines, Iowa.

**DOUBLE** Entry bookkeeping 60 hours with 3 keys guaranteed. (Diploma.) International Bookkeeping Inst., 3 Springfield, Mo.

**BEST** Books for \$1. All formerly sold for \$2.50 to \$5 each. Select from the following list of guaranteed bargains. All brand new books: Woodcraft for Scion. Book of Letter Writing by Cressiter. Elements by Richter. Creative Chemistry by Simpson. Revolt in the Desert by Lawrence. Trader Horn. White Shadows in South Seas by O'Brien. Count Luckner (The Sea Devil) and Outline of History by Wells. Delivered at your door C. O. D. Simply pay postman \$1 each and postage. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.

**DON'T** Prepare for any civil service examination without seeing our catalog. Free. Columbia Correspondence College, Washington, D. C.

**GET** Steady government job, \$105-250 month. Men-women, 18-35. Particulars free. Write. Instruction Bureau, 101, St. Louis, Mo., Today.

**YOU** Need a better grip on mathematics? Ask us to send you a copy of "Mathematics for the Practical Man," only \$1.50. Its common sense methods at remove the mystery and difficulties so algebra and calculus are made simple. Assuming your knowledge is limited to arithmetic you quickly and easily gain a working knowledge of algebra, geometry, Trigonometry and calculus. Simply pay postman when he hands you the package. Address Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago, Ill.

#### SHORT STORIES

**SHORT** Stories revised, illustrated and marketed. Details free. Hursh Service, Box 1-1818, Harrisburg, Penna.

#### TYPEWRITERS AND SUPPLIES

**TYPEWRITERS** At wholesale: all standard makes \$5.00 up; opportunity for dealers and private individuals. Send for list. Shore Typewriter Exchange, Atlantic City, N. J.

**TYPEWRITERS**—All makes, guaranteed. New low prices. Free catalog. Typewriter Exchange, Ada, Okla.

**TYPEWRITERS.** Boston. Motorcycles, \$4.99-\$24.99. Terms, Agents, Knight's, 1506 Locust, St. Louis, Mo.

**TYPEWRITERS.** Adding machines, check-writers, mimeographs, Milbourn, 2305 Kellogg, Wichita, Kansas.

**TYPEWRITERS**—All standard makes \$10 up. Catalog free. Northwestern Typewriter Exchange, 121 N. Francisco Ave., Chicago.

#### ADDING MACHINES

**NEW** \$1.75 Automatic Adding Machine. Fully guaranteed. Bassett 1458-A, Hollywood Avenue, Chicago.

#### PRINTING, MULTIGRAPHING AND MIMEOGRAPHING

**1,000** 5x4x11 LETTERHEADS, Envelopes or business cards \$2.50. 1,000 Receipt statements \$2.50. 5,000 envelope inserts \$4.75. Cuts used. Samples. Halberstadt Printing, Terra Haute, Ind.

**WE** Print stationery, booklets, catalogs, circulars. Samples. Commercial Press, Hialeah, Ohio.

**LETTERHEADS.** Envelopes, 500, \$1.10 1,000, \$2.00; 5,000, \$8.00, plus postage. Samples. Foy & Kimballs, Newport, N. Y.

**200** BUSINESS CARDS. Exceptional printing—original, receipt \$1.00. Lester Milligan, Little Rock, N. Y.

**5,000** ATTRACTIVE Posters, \$11.50; 5,000 envelope slips, \$5.00; 5,000 6x9 circulars, \$7.50. Samples. Goodprint, Harrisburg, Pa.

**QUALITY** Printing! Reasonable prices! Send for free standardized samples and prices. Posters, Circulars. Catalogs our specialty. Ernest Farnes, 525 South Dearborn, Chicago.

**PRINTED** Letterheads, envelopes, cards, etc. Quoties. Reasonable prices. Ward, Box 331, Ft. Madison, Iowa.

**200** SHEETS, 100 Envelopes, 600. Applebaum-P, 1258 Brook, New York.

**1000** BUSINESS CARDS \$2.75 postpaid. Samples. Miller, Printer, Nazareth, Pa.

**250** BOND Letterheads, envelopes, bill books, cards, \$1.35 each. Economic Press, Leonia, N. J.

**200** LETTERHEADS And 100 envelopes, \$1.40; 200 letterheads, 8x4x11, 150 envelopes, \$2.00; 350 cards, \$1.00. Haasler Print Shop, Portland, Ind.

**INSTINCTIVELY** Different printing service awaits request for proof it will save money. Time, labor, regret. Let us show you striking evidence, free. Hatfield Press, Gettysburg, Penna.

**PRINTING:** 1000, 3x5 Circulars, 500 postpaid, our ad on back. Cycle Press, Appleton, Calif.

**THREE** Color business cards, \$2.95 thousand. Present, 1715% Wood, Dallas, Texas.

**250** LETTERHEADS Or envelopes \$1.25; 500 \$2.00. Arts, 15-1611-M, Denver.

**250** LETTERHEADS, 250 Envelopes, raised letter printed, postpaid \$1.50. Samples free. Sinko, Niagara, N. Y.

**200** 3x5 RULED Bond statements, \$30c postpaid—1,000 \$1.85. Taylor Printing Co., Ames, Kans.

**SOMETHING** New—100 paneled personal cards and cases 50c. Agents wanted. Sample case 15c. Anderson Co., 11825 Woodland Ave., Chicago.

#### PRINTING OUTFITS AND SUPPLIES

**PRINTING** And typography for beginners by Lesling instructor of printing and typography in the public schools of New York City. 108 pages, 5x8, \$1.50. Carl Edquist, Odessa, Minn.

**COMPLETE** Printing outfit, presses, type, ink, paper, supplies. Write for free catalog. Kelsey Co., R-11, Meriden, Conn.

**\$1,000** PRINTING Business for \$300.00. Ship anywhere. Pitt, Anson, Iowa.

**MIMEOGRAPH** For sale, used and re-conditioned. Write for particulars. Bond Equipment Company, 207 Cardinal, St. Louis.

**PRINTING:** Quoties—Presses, type supplies, type novelties. Send stamp for catalog. Model Press, York, Penna.

#### GUMMED LABELS

**GET** Our prices on labels: Gummed and un gummed. Send sample of your label for prices. circulars, address labels, letterheads, envelopes, booklets. Plain or in rollers. Write us. Old Dominion Label Company, Bridgewater, Va.

**TRIAL** Thousand Tuxedo stickers, 75c. 15 words. Harvey Wolf, 6018P Quimby, Cleveland, Ohio.

**1000** GUMMED Labels with your name, address, business 50c each. Carl Edquist, Odessa, Minn.

#### DUPLICATORS AND DEVICES

**"KACELLOGRAPH"** Rotary stencil duplicator \$39.00. "Two-Faced" film duplicator \$9.00. Booklet free. Pittsburgh Typewriter Supply, Dept. 601, Pittsburgh, Pa.

**STENCIL** Duplicator—Anyone can make. Particulars, samples free. Imperial Laboratories, Edwardsville, Ill.

#### RUBBER STAMPS

**START** A profitable business at home making rubber stamps. Complete course 50 cents postpaid. N. Bishop, 603 Lulu St., Kalamazoo, Mich.

**RUBBER** Stamps. Name, address 35c. Stamp Works, R223C, Auburn, Nahr.

**NAME** Address, 2 lines 25c, 3 lines 35c. Newman, 2288 O, Lincoln, Nebr.

#### FOR MEN

**SHIRTS**—Cotton shirts. Samples 10c, 20c. Meyer G P O, Box 471, New York.

#### FOR THE HOME

**CECIL** Chests only \$11.65—"Bed-4-Kid" complete with rich copper trim—you assemble and save half—send for pictures. Kuegel Furniture Company, Guttenburg, Iowa.

#### FOR SMOKERS

**HOME** Cigarette machine? Illustrated circular. \$3.75 postpaid. Automatic Cigarette Machine Wks., 1053 Sheridan, Chicago.

#### FIELD GLASSES, TELESCOPES AND MICROSCOPES

**SPECIAL.** Central barometer \$2.95—4 power Wollensak field glass, \$3.95. The new Leontia Pencil Microscope working from 15 to 50 diameters—with extra objects—200 characters, \$9.75. Send for our bargain book. Central Camera Company, Dept. 261, 230 South Wabash Ave., Chicago, Ill.

**BINOCULARS.** Field glasses, telescopes, microscopes. New used. All makes \$1 up. World's largest assortment. DuMaurier Importers, Dept. 206-A, Elmira, N. Y.

**\$5.00** POWERFUL Telescope, good condition. Bought 500 telescopes from government, all sizes and makes. Send free list binoculars, Field glasses, airplane cameras, lenses, musical instruments and government radio sets and parts. Webb's Curiosity Shop, 20 South Second St., Philadelphia, Pa.

#### FOR MECHANICS

**INTERIOR** Wall decoration is a valuable new book covering all the modern methods of artistic wall treatments. Practical working instructions for both plain and decorative finishes are given. 151 pages, illustrated. Delivered to your door C. O. D. Simply pay postman \$1 and postage. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.



**ELECTRICAL** Trouble shooting on the motor car and airplane. Don't trust to luck or guess work. Learn to make every motion count in testing and repairing. Send for our standard 492-page book for electricians and mechanics. 200 diagrams. Hundreds of practical tests. For postman \$1.00 plus postage when delivered. If outside U. S. send when ordering. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.

#### RAZORS AND BLADES

**FREE** Sample. Patented razor blade. Fits all type Gillette holders. Perfection. 4510 No. Ashland, Chicago.

**YOUR** Bull Gillette blades sharpened, 1c each. Pelzer, Westergaard, Rockford, Ill.

#### DIAMONDS, CLOCKS, WATCHES AND JEWELRY

**FOUNTAIN** Pen, 14K gold point, Iridium tipped. Fully guaranteed. One dollar. J. Mahoney, Box 111, Trinity Station, New York.

**CASH** For old gold, silver, platinum, jewelry, crowns, bridges. Satisfaction guaranteed. Cash mailed day shipment received. Chicago Gold Refining Co., 8 S. Wabash, Chicago.

**J. R. WATCHES**, will sell reasonably. Send for price list. Mount Chase Jewelry & Optician, 1138 W. Grand Ave., Chicago.

**CLOCKS** Electrified: suits as low as \$2.95. Splendid opportunity for handy men. Breckinger the Clock Maker, 1675 Ruffner St., Pitts.

#### GUNS, FISHING TACKLE AND SPORTING GOODS

**BASBALL**, Tennis, golf, etc., supplies. Special prices. Catalogue 4c. Sports Supply, 200 East Superior St., Minneapolis, Pa.

**GUNSMITH**—Buckskins, testing, re-fishing, repairing, parts supplied. Sauters Bros., Barryville, Ark.

#### ANTIQUES, WAR RELICS AND INDIAN GOODS

**MEDALS**, War relics. Catalog 10c. Darr, 670 E. 42, Brooklyn, New York.

#### ANTIQUES, WAR RELICS AND INDIAN GOODS

**INDIAN** Relics, for the collector. Our bargain lists free. The Exchange House, Blackwater, Virginia.

**200 ANTIQUE** Clocks. Rare specimens. Grandfathers, Bracket. Wethered, Watchmaker, Bath, England.

**SEND** or For fine new list Indian relics, antique treasures. F. E. Ellis, Webster Groves, Missouri.

**INDIAN** Relics. Coins. Curls. Beadwork. Catalogue free. Vernon Lowley, Osborne, Kansas.

#### MUSIC AND MUSICAL INSTRUMENTS

**PLAY** Piano jazz by ear. I have taught thousands. Secret sent free. Write, Professor William Mulhenny, Jazz Pianist, Toronto, Ontario.

**UNKNOWN** Songwriters. If music publishers refuse your song, write Austin, 622 Fifth Street, Brooklyn, New York.

**FREE**—Actual method used by "Hit" writers. Tate-International, Memphis, Tenn.

**SONGWRITERS**—"Real" proposition. Hubbel, 111, 2103 Kew-Forest, Chicago.

**"BANKERS"** Should interest all musicians on account of the popularity of the banjo, as it easily increases a player's income. Also, catalog of 48 pages free. The Barton Banjo Co., Inc., Groton, Conn., U. S. A.

**SONGWRITERS**: Free examination of song-poems or complete songs. Aid in preparation and marketing. Unshakable returned immediately. Chester A. Fisher, Music Publisher, 125 W. 4th St., New York City.

**COMPOSERS**—Voice or music. Brilliant opportunity. Write VanBuren, 2559 McHugh Bldg., Chicago.

**SONGWRITERS** Write now for free booklet how to make money out of songs, by America's well-known composer, Stan Tucker, 120 Wadsworth Ave., New York.

**SONGWRITERS**—Poems, melodies, opportunity, legitimate. Write Tamme Stelle, 124 42nd North Ave., Chicago.

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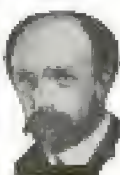




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View of Part of Replica of Famous Indo-Chinese Temple of Angkor-Wat. One of Exhibits of French International Colonial Exhibition; on Opposite Page Is a General View of Part of Overseas Assembly at Paris. Taken from Angkor-Wat, Replica of Thirteenth-Century Temple in Indo-China

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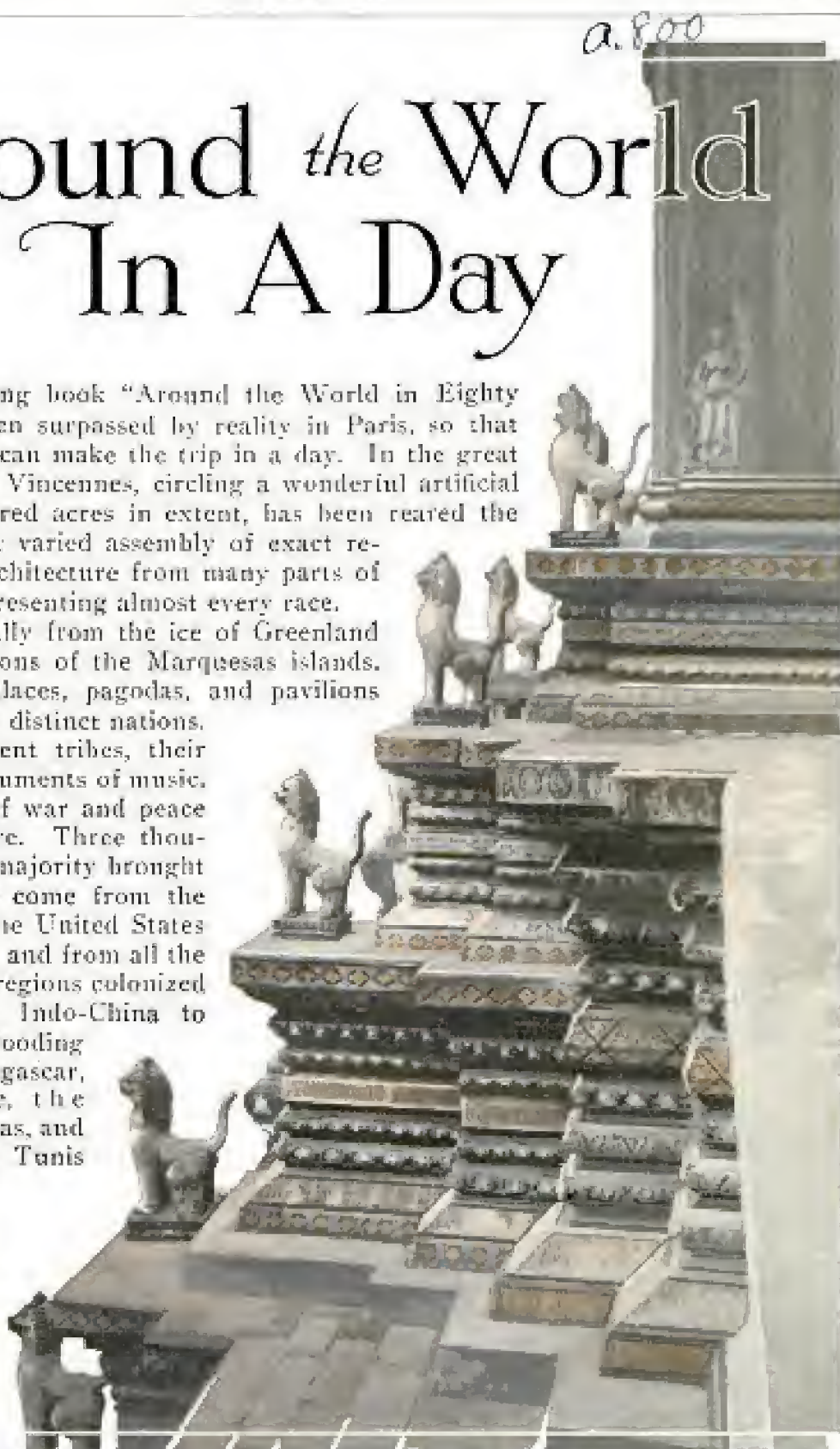
No. 6

## Around *the* World In A Day

THAT enthralling book "Around the World in Eighty Days" has been surpassed by reality in Paris, so that this summer you can make the trip in a day. In the great national forest of Vincennes, circling a wonderful artificial lake several hundred acres in extent, has been reared the greatest and most varied assembly of exact reproductions of architecture from many parts of the earth, and representing almost every race.

It reaches literally from the ice of Greenland to the warm lagoons of the Marquesas islands. Four hundred palaces, pagodas, and pavilions represent fourteen distinct nations. A hundred different tribes, their foods, songs, instruments of music, and implements of war and peace are assembled here. Three thousand natives, the majority brought by airplane, have come from the protectorates of the United States and other nations, and from all the far-flung colorful regions colonized by France—from Indo-China to savage Senegal, brooding mysterious Madagascar, happy Martinique, the romantic Marquesas, and historic Morocco, Tunis and Algiers.

This exhibit of so many tribes and nations, their buildings of the past and present, pictures the life work of Marshal Hubert Lyautey, the



*French International  
Colonial Exhibition*

*Acme*

881

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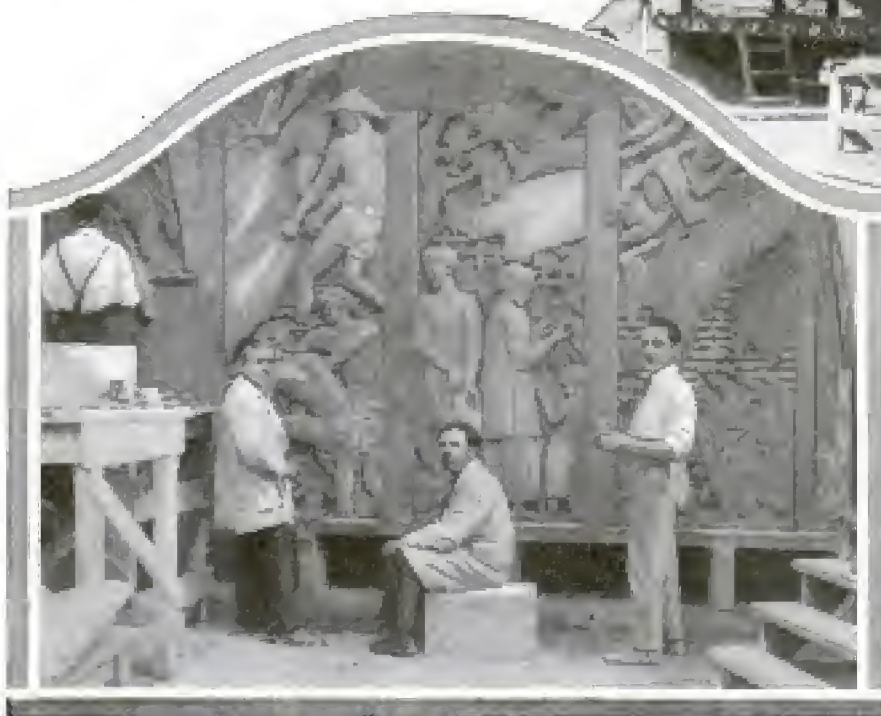


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Above, Replicas of Sudanese Village Erected at Paris for Overseas Colonial Assembly; Left, Royal Palace of King Hova and Tower of the Bulls, Reproduced in Paris

Right, Temple in Isle of Bali, in Dutch East Indies, Built at Paris by Holland; Below, Part of Stone Frieze Telling in Sculpture Story of France's Colonial Endeavors on Wall of Permanent Museum



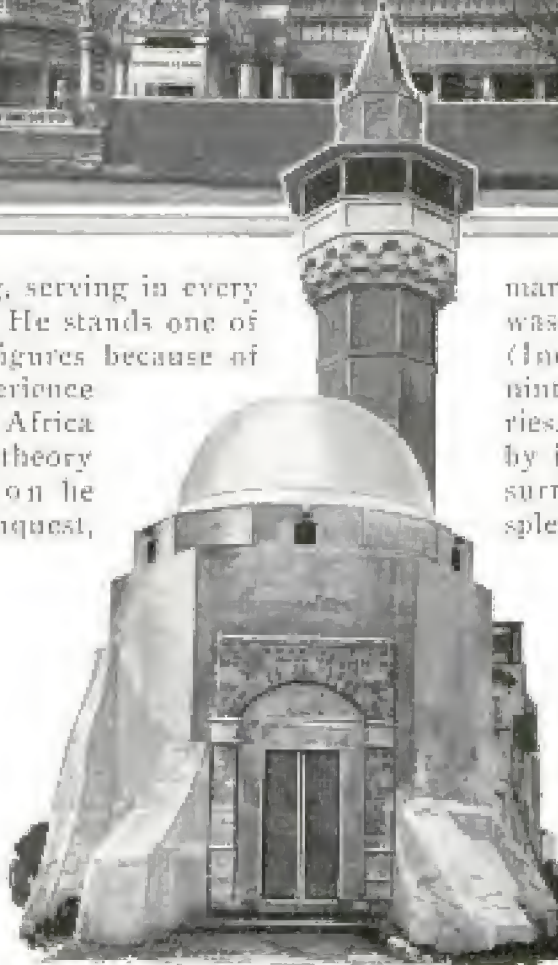
greatest colonizer of the French nation in this century, and realizes a long-cherished dream of his. He has been named "Lyautey Africanus," after the manner of the ancient Romans. For forty years this intrepid soldier has been continually active in the work





of scientific colonizing, serving in every quarter of the globe. He stands one of the most interesting figures because of the range of his experience from the South Seas to Africa and Indo-China. His theory of creative civilization he calls the six "C's": Conquest, Comprehension, Co-operation, Construction, Conservatism, and Commerce. This "Overseas Reunion" at Paris is a magnificent summing up of the endeavors which have brought peace, education and prosperity to millions of people of varied colors and creeds.

Along the shores of the great lake, on either side of wide driveways, stands a wonderful collection of vividly contrasting structures. Undoubtedly the triumph of the entire creation, both from an artistic and historic point of view, is the astonishing replica of the temple of Angkor-Vat, part of the



Above, General View of Replica of Temple at Angkor-Vat; Below, Tomb and Tower Built at Paris for Overseas Colonial Exhibition

marvelous Khmer city which was erected in Cambodia (Indo-China) between the ninth and thirteenth centuries. The race was overcome by invaders, and jungle now surrounds what was once the splendid home of millions.

As a complete tale of colonization, however, the Colonial Museum, an enormous oblong building of solid stone, is perhaps an even more important creation than the temple, because it will remain as a permanent home to house the history of France's success in various corners of the world. The building occupies an area of 264 by 180 feet.

Upon its outer face is carved a gigantic bas-relief, in which men 3,000 years hence may read the story of the colonial effort in the nineteenth century.

Palaces, temples and pavilions present a vivid clash of forms and color—the dark red of a temple in Senegal bristling with

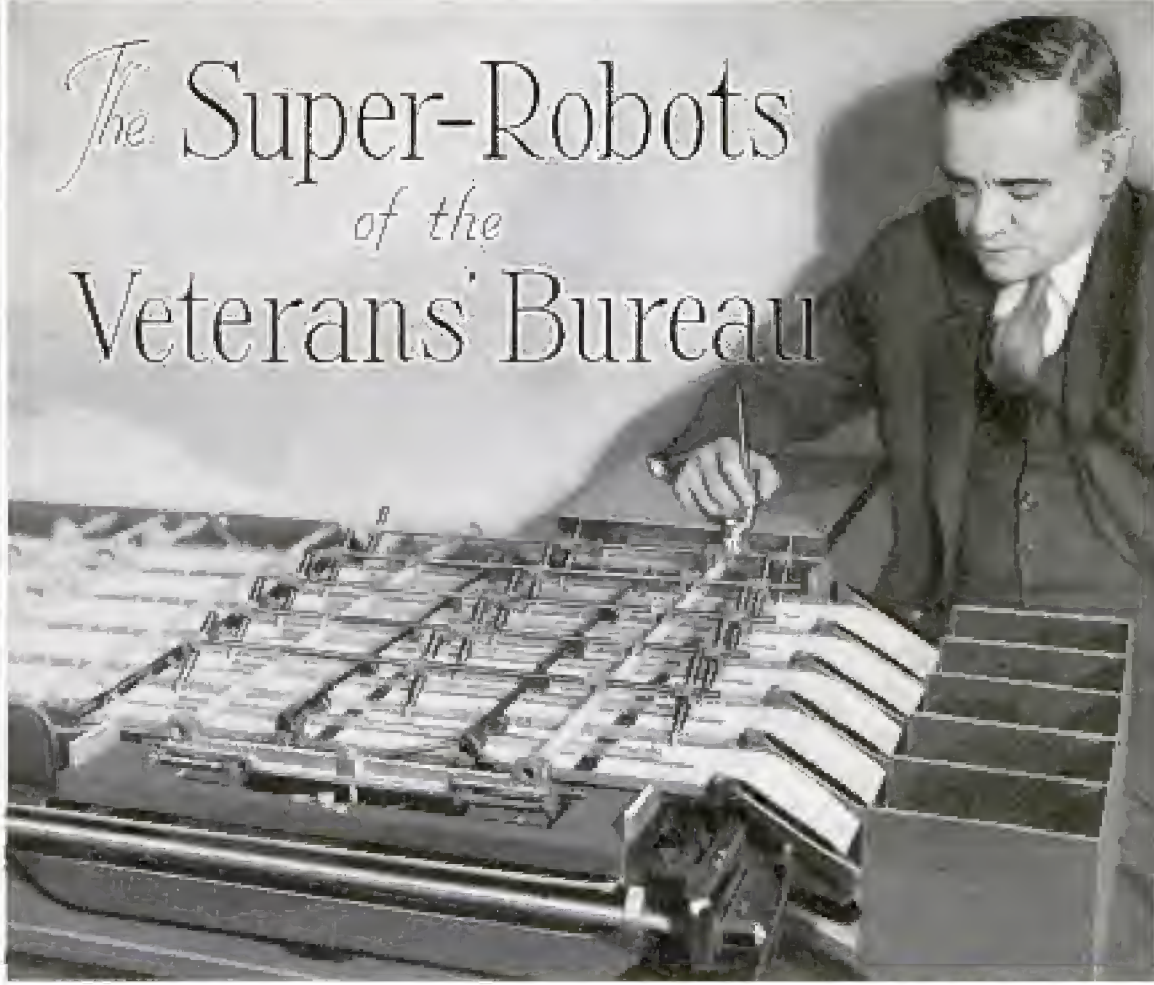






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## The Super-Robots of the Veterans' Bureau



Official Check Signer for Veterans' Bureau Using Master Pen Enabling Him to Sign Fifteen Checks at Once; Roller-Bearing Pivots Make Possible Duplication of Every Move of Master Pen

OF ALL the queer-looking robots developed by science to amaze the world, very few can compare with the master pen now being used by the veterans' bureau in Washington to help make out thousands of checks to former service men.

This super-wizard actually enables a single man to sign fifteen checks at one time. A pneumatic feed system automatically projects fifteen checks, grouped in fives, to a position exactly in front of Mr. L. Ard, official signer. Whereupon he takes his master fountain pen in hand, and then, without actually touching his pen on paper, goes through the motions of signing his name. Immediately all of the mechanical pens write "L. Ard" on the checks just below them. Next Mr. Ard presses a button which operates a belt system that not only carries the signed checks into receiving hoppers, but simul-

taneously transports a new lot of unsigned checks into proper position to be signed.

Hardly less novel in workmanship and efficiency than the master pen are some of the other mechanical aids of the bureau. There's an automatic fingerprinting outfit for checks that utilizes a tiny motion-picture camera to make a permanent record of all checks for future use in emergency cases where there may be doubt as to ownership, mistake or fraud.

Then there is a large assortment of funny little mechanical hands and feet which push, roll and kick the checks into envelopes for the final sealing process just before they are ready for the mail. If the slightest mistake is made, these tiny gadgets immediately pave the way for its correction, truly performing as automatic detectives.

Who ever heard of making carbon





Projector Used to Examine Checks After They Have Been Recorded on Movie Film; Right, Fingerprinting Outfit That Utilizes a Tiny Movie Camera to Make a Permanent Record of Checks Dropped into the Hopper

copies of checks? Yet this thing is done in the case of every check. Rolls of manila paper are placed in the check-printing machine, beneath the checks, and run through the machine along with the checks themselves. These carbon copies are retained for emergency purposes.

For each check-printing machine, the average production is about four checks a minute, 2,500 an hour or 16,000 for the regulation seven-hour day. Figure it out for yourself if you want the monthly number, bearing in mind that the average month at the veterans' bureau consists of twenty-five working days.

The inserting and sealing device was developed especially for the purpose. Up to 20,000 checks a day may be inserted and sealed in the window-type envelopes, this kind being used so that a separate address won't have to be printed on the outside of each container. This machine is entirely automatic, except for the necessity of placing checks and envelopes, each stacked separately, into a receiving hop-

per. Numerous rubber and metal fingers, operating on the friction principle, push checks and envelopes along until they almost touch each other. Whereupon two tiny mechanical feet give the envelope a vigorous kick, causing it to open slightly and permitting two rubber fingers to open it still more, while, a bit farther down the line, two additional fingers push the check inside and into proper place.

After the check has been inserted, the flap of the envelope travels under a moistening device and the friction principle causes the envelope to travel still



farther along until it hits a small projecting arm. This closes the flap and the envelope continues on its way, coming to rest in a stacking device.

In a very real sense this inserting and sealing device is an automatic detective, for it never fails to discover any error. If two checks have been inserted erroneously into an envelope instead of one, the machine stops immediately, the same thing happening if no check at all has been inserted, or if a check is torn.



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Holding promise of bringing to the medical profession a successful treatment for rheumatism, a vaccine for that ailment has recently been developed and now is being tested. Prof. Benjamin J. Clawson, of the University of Minnesota medical school, in announcing the vaccine, said that it is still in the experimental stage and cannot be made available for physicians for at least another year. The active agent is an organism isolated from the blood of persons with acute or chronic arthritis. This germ is heat-killed to make a vaccine in the conventional manner, and injection is directly into the blood stream.



Model of One of Buildings for Chicago World's Fair; This Semicircular Structure of Unusual Design Is the Hall of Science

WORLD'S FAIR SCIENCE HALL  
SHOWN IN MODEL FORM

One of the striking pieces of architecture for the Chicago World's Fair will be the Hall of Science recently completed in model form in full color. The model shows a semicircular structure with offset stories resembling the gallery arrangement in a theater, and a large court in the center.

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A. 802

Kansas City Times 4/3/31

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A-1743 Capt. John F. Coggswell  
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Plane Stranded in Ice and Snow in British Columbia;  
Left, Wreck of a Sealer Crushed in Ice off the Coast  
of Labrador

By JOHN F. COGGSWELL

WHEN, on March 15, the sealing steamer "Viking," fast in the ice floes off Horse island, Newfoundland, was sent to the bottom by an explosion, two modern devices—radio and the airplane—gave added proof of their value in reducing the dangers of one of the world's most hazardous occupations.

The North Atlantic seal fishery, which each spring calls many hardy Newfoundlanders to the ice to hunt the hair seal for its valuable fat and oils, still rates as a most perilous manner of earning a living. During the past fifty years, the death roll of the sealers has totaled over a thousand.

By far the greater number of these lives were lost before the vessels of the sealing fleet were equipped with wireless. The death toll is still large, but much smaller than before modern communication apparatus took its place in the reduction of hazards and the effecting of rescues.

More than a score of men lost their lives in the "Viking" disaster, most of them killed by the force of the explosion. Had it not been for young Otis Bartlett, at the key in the wireless station on Horse island, the death list probably would have included the names of every man in the "Viking" crew and, perhaps, also those of the residents of the island upon which the sealers found refuge.

Consider the case of the sealer "Tiger," which went down under similar circumstances during the early 90's. The "Tiger" had gone to the ice in search of the seal herd early in March. In lower latitudes, March marks the start of the break-up of winter; off Newfoundland, low tempera-



# Speeded *by* Radio *and* Planes



Movie Outfit on the Ice, Taking a Sealing Picture While Their Ship Is Locked in Ice Near By

tures, high gales and fierce blizzards extend through most of April.

Taking advantage of every lead of open water into the ice pack, the little ship penetrated far into the floe. For several days, the "Tiger" had been fast in the ice without movement, save with the drift of the pack, while her crew ranged far afoot hunting the herd. Then a lead broke open a mile or so ahead. Dynamite was used to loosen up the ice between the ship and the open water.

A hawser was run out over the bow and most of the crew of 150-odd men took

to the ice to lend the strength of their lusty arms to that of the throbbing propellers. The old boilers proved incapable of holding the pressure and let go in an explosion that tore the craft nearly in two amidships. Twenty men were killed outright by the explosion; over 130 hands, some of them wounded by the blast, were left marooned on the ice. Hardly had they begun their trek over the heaving pack in the direction they thought best for locating another

ship, when a blizzard howled down out of the north. When it was over, nearly half of the sealing band had perished. Four days later, the watch of another sealer saw a group of staggering men approaching.

They were weak from lack of food and exposure. Of the entire crew of 150, fewer than half reached safety and many of these were maimed for life. They had covered over thirty miles of rough ice; had they but known it, they could have found refuge on an-







Pans Piled High by Rafting Ice; When a Ship Is Crushed in Such a Situation, the Sealers Have Small Chance of Making Much Progress over the Rough Ice That Is Stacked Up

other sealer that was within ten miles of the scene of the explosion. It was several weeks before news of the disaster and the bodies of the dead reached Newfoundland. That was the usual picture of a sealer catastrophe, before the ships were equipped with wireless.

The "Tiger" death roll, in all probability, would have been exceeded by that of the "Viking" disaster, had it not been for the twenty-one-year-old lad at the key of the Horse island wireless station. The winter population of the island, a desolate bit of rock far from the Newfoundland coast, is a small one and ill equipped to take care of an influx of 120 men. By March, food supplies are greatly reduced and only under extraordinary conditions can further supplies be received from the mainland. The wireless it was that brought relief and spread before the newspaper readers of the world the drama of the ice pack. At the first streak of dawn on the sixteenth, young Otis Bartlett saw clouds of smoke rising from the spot far off in the ice, where the day before he had spied a sealer fast in the floe. Immediately, he

flashed out the news of a sealer on fire off the coast of Horse island. Upon arrival of the first survivors at the island, he told St. Johns that Horse island was going to need a lot of food and need it quickly.

The first message was picked up by operators aboard several sealing steamers—among them, the "Imogene," "Neptune," "Eagle" and "Boethic"—operating in the outer stretches of the Gulf of St. Lawrence. Immediately, the sealers left their hunt and steamed to the assistance of their fellows. Luckily, they found the Belle Isle straits free of ice and were able to reach the scene of the disaster in time to save the lives of several men unable to reach the island.

Within a few hours after the St. Johns operator had picked up the appeal for food supplies and medical men, the "Sagana" was steaming out of the harbor to the rescue. When she arrived at Horse island, everyone ashore had been reduced to rations of one small meal per day. Food supplies were practically exhausted when a boatload of provisions was pulled ashore over the ice.





Picture Taken from the Deck of a Sealing Vessel as Members of the Crew Start Out over the Heaving Ice Pans in Cautious Pursuit of a Herd of Seals That Has Been Spied in Distance

Help also went to Horse island by air. A few days after the catastrophe, Bernt Balchen, airman extraordinary of the Byrd south-pole expedition, with two companions, took off from Boston airport in a giant Sikorsky amphibian plane, to make base at St. Johns. The plane hastily had been fitted with extra gas tanks that brought her gasoline capacity up to 530 gallons and her cruising radius to ten hours.

The "Viking" disaster, brought before the world so dramatically by radio, is not the first in which the works of modern science have brought life to sealers marooned on the floes. Many a sealing ship crushed in "rafting" ice, such as held the "Sagana" off Horse island for many days, has gone to the bottom and left her crew ill-equipped to face the elements. In the old days, that meant almost certain death, unless another craft happened to be near.

Capt. Alpheus Barbour, who followed the seal herds for nearly forty years and commanded the "Diana," sister ship of the "Viking," for eleven years, gives a vivid picture of the perils besetting the vessel

caught in rafting ice. The ice pack, it should be told, is in constant motion, driven forward by winds and ocean currents.

The sealing ship caught in the ice—and the constant endeavor is to penetrate the floe as far as possible—moves forward with it and is in little danger unless an obstacle such as an island comes in the path of the drifting pack. Then the ice pans, under the irresistible force of the forward movement, begin piling up, a condition known to the sealers as rafting.

"Rafting ice will often crush a ship into matchwood," explained Captain Barbour. "Once the pans get over the vessel's gunwales, she is doomed. One morning, in bright clear weather, we left port in the steamer 'Ranger.' By nightfall, we were at least ten miles into the ice pack. At midnight, the sky had clouded over and a blizzard came howling down from the northeast. For a few hours, we were driven along with the pack; then things began to happen.

"The ice started to raft. With loud crashes and explosions, huge pans were



A-743  
892

forced up on top of others and began pounding against the sides of the ship—it sounded as though a thousand calkers were plying their hammers on her boards. Every man was ordered overboard, each armed with an ax, to chop desperately at the piling pans to keep them from over-running the ship. The cakes crunched, ground and crackled about the vessel; her timbers creaked and groaned.

"For a time, it looked as though our efforts would be in vain. The ice pans mounted to the ship's rail. Then, suddenly, she careened and lifted and we knew we were saved for the time being; the ice had begun running under the ship and lifted her high onto its surface.

"At daybreak, we found that we were scarcely fifty feet from the jagged rocks of a small island. For eleven days, we lay there motionless and helpless, held tightly on top of the field by the force of the wind. In the meantime, the piled-up pans had frozen into a solid, high barricade against the island.

"There was only one chance to save the ship: to turn her head and get her up against the barricade in hope that the sheer force of the rafting floe would force her around the island. The captain staked everything on that one chance. We un-

loaded the entire supply of dynamite and powder, set more than fifty charges in the ice and finally freed the ship."

In contrast, it was but a few years ago that airplane and wireless combined to save the entire crew of the "Resolute," caught in rafting ice off an isolated island of rock. The ship was equipped with wireless. When her master found that her timbers and plates were giving away under the force of the rafting ice, he sent out an SOS call, giving the ship's position and telling of her plight. Within an hour, an airplane roared out from Harbor Grace airport. Arriving on the scene the pilot found the vessel smashed and the crew on the island and the ice.

He circled them a couple of times and then flew off to bring aid. Twenty miles away, he found another sealer; already the skipper, in response to the "Resolute's" call, was making his way toward that portion of the floe.

The airman told the captain he would direct him to an open lead that would bring the ship within five miles of the stranded men. Then he flew back to the wrecked hunters and dropped a message telling them of the approach of the rescue ship. They streamed across the ice and reached safety without losing a man.



Two Members of Crew of Sealer "Viking" Adrift in the Ice Floes Just Before They Were Picked Up by a Rescue Ship; One of the Survivors Later Succumbed from Exposure



## THIS BOAT TRAVELS ON LAND AS WELL AS WATER



*Active*

Water-Land Craft That Can Clamber Out of a River and Skim down a Highway; It Has a Speed of Twenty-Five Miles an Hour in the Water or Forty Miles on a Good Road

Dry land offers no obstacles for an auto-boat built by a New Jersey man which can clamber out of a lake under its own power and speed down a highway, or reverse the process without a moment's delay. The water-land craft is equipped with an undercarriage to which small wheels are attached for running on land. The boat can skim along the water at twenty-five miles an hour or speed on a highway at forty miles an hour.

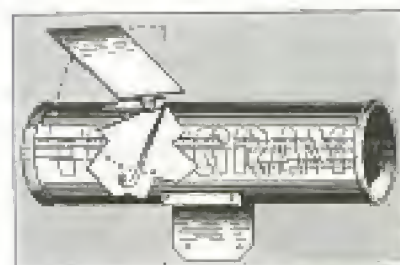
### WANTED—A MECHANICAL NOSE TO DETECT POISON GASES

Science has invented vacuum tubes to extend the human senses of hearing and seeing, but no one has yet found an electrical nose. Some gases are so powerful that they will injure a person in a few seconds, but the human nose must still be relied on to detect minute traces of chemical substances that might otherwise pass unnoticed. Man can produce almost any desired odor chemically, but he cannot as yet detect an odor chemically, electrically or mechanically. There is a vacuum tube that will measure the light from a star millions of miles away, and light-sensitive photo-electric cells, or electric eyes, perform many tasks formerly delegated to human eyes, while vacuum tubes translate sound waves into electrical waves or reverse the process.

Smelling, however, involves a very delicate chemical operation, and no mechanical substitute for the human nose is yet in sight.

### AUTOMATIC FLAG ON MAIL BOX SIGNALS PAPER DELIVERY

Those who anxiously await the delivery of the daily newspaper now can be signaled of its arrival if equipped with an automatic paper box for the mail carrier or delivery boy. This box is a long cylindrical container that accommodates a rolled newspaper. When the paper is inserted, a flag at top rises automatically.



Newspaper-Delivery Box Equipped with Automatic Flag

*General Electric Co. N.Y. City. R. Hampden  
Schenectady, N.Y. Reedville Oregon.*

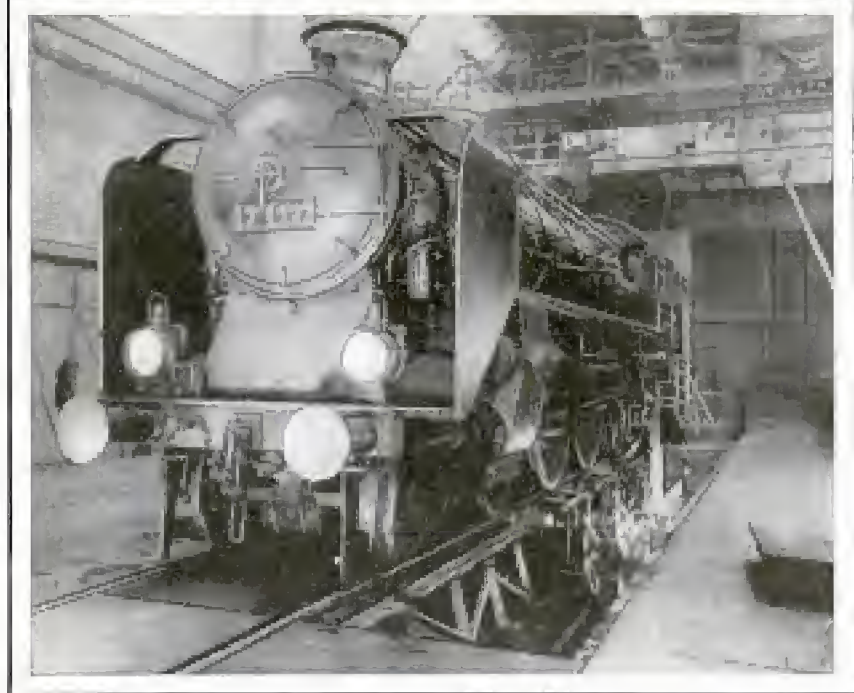


Cont. M. W. Lowry  
Athens, Ga

A-676

A-787

Electric Mechanical Co



© P. & A.

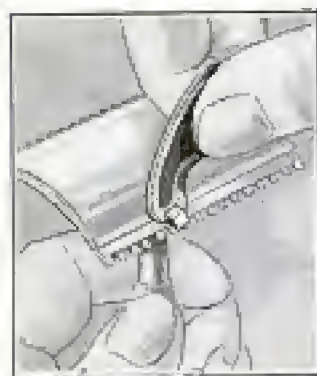
Test Stand for Locomotives Where the Engines Are Run for Many Hours at High Speed to Check Performance and Stability

### TEST STAND FOR LOCOMOTIVES SHOWS ENGINE'S ABILITY

Once each year the locomotives of a German railway are examined for stability and performance by placing them on a special test stand. Here each engine is operated for many hours as though on an actual run, and careful check is made of its performance. The whirling wheels of the stationary locomotive often revolve to equal an engine speed of eighty miles.

### SMALL TOOL SHARPENS RAZOR WITHOUT REMOVING BLADE

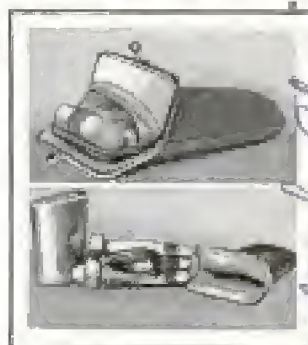
Sharpening a safety razor without removing the blade is possible with a small tool which requires only one stroke to give a keen edge. The sharpening element is contained in the tip of a metal handle so shaped as to be easily grasped between thumb and fingers. It is drawn lengthwise across the blade from end to end with a single very light stroke.



athletic field, the irritation proved so annoying that a football team could not practice, until the field was covered with a layer of other soil.

### LUNCH OUTFIT FOR THE CAMPER IN SMALL CARRYING CASE

Necessary table cutlery for the camper or tourist is contained in a compact leather carrying case which takes up no more room than a purse. In addition to knife, fork and spoon, the kit carries pepper and salt shakers, a drinking cup and other utensils.



### A NEW VEGETABLE MEAT

Described by its makers as a "vegetable meat," an edible product is being manufactured from cottonseed. It is used like meat for sandwich fillings and, like meat, is rich in protein. Some chemists claim there is enough protein in the annual crop of cottonseed to supply 50,000,000 persons with all this nutrient they require.

Bowden Jewelry Co  
425 E. 8th St. Los Angeles, Calif.

Wesson Oil Co  
Product Exchange  
Annex 10, New York

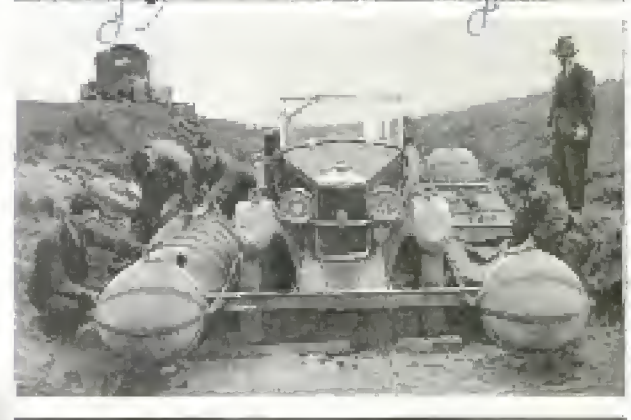
Waterbury Chicago

Chi. 1464 W. 37th



*A. 755 Built for Capt. Seaffrey*  
*Riley Ltd.*  
*Harbar Ave. Foleshill, Coventry*  
**POPULAR MECHANICS**  
*Malinsley Riley*  
**AUTO THAT CAN SWIM A RIVER**  
**HAS DETACHABLE FLOATS**

Rivers and lakes offer no obstacles to a seagoing automobile constructed in Great Britain for a 12,000-mile trip through Europe and Africa. The car is provided with a detachable frame to which are



Seagoing Auto, Showing Detachable Floats Being Inflated and the Car Entering a River

fastened four large air bags. When these are inflated, the car can enter the water, riding high enough so that its motor is not put out of operation. Paddles affixed to the tires propel it through the water, power being supplied by the engine. This enables the auto to cross streams in the wilderness without the aid of boats or rafts.

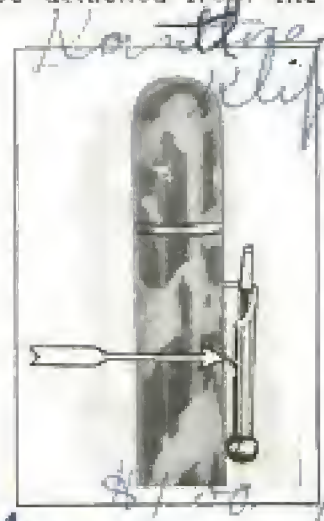
**MERCURY VAPOR IN GENERATOR WILL REPLACE STEAM**

Producing power more cheaply than existing steam plants, a large turbine electric generator using mercury vapor in-

stead of steam is being constructed at Schenectady, N. Y. This 20,000-kilowatt turbine will have twice the output of a mercury-vapor engine and generator that has been operated for a year at Hartford, Conn. The latest project will be the first outdoor steam plant. The mercury is boiled over a fire and the vapor is played on the blades of a turbine wheel as in a steam generator but at a much higher temperature. The advantage of quicksilver over water is due to its higher boiling point, allowing the engineer to use his mercury at 950 degrees Fahrenheit without producing too high boiler pressures. The hot mercury vapor in the exhaust of the turbine is used to raise steam for other turbines.

**PENCIL CLIP THAT HOLDS FAST UNTIL GRIP IS RELEASED**

Pencils and pens now are available with clips that cannot be detached from the vest pocket unless the wearer unfastens them. The clip is provided with a prong which is slanted upward and digs into the cloth if the pen is pulled upward. Pressure on a ring releases the prong when the owner desires to use the pen for writing.



*General Electric*  
*Schenectady, N.Y.*

*Gordon Pen Co.*  
*West New York, N.J.*  
*Copyrighted material*

*4/4/31*  
*Sci. News*  
*Science 523*

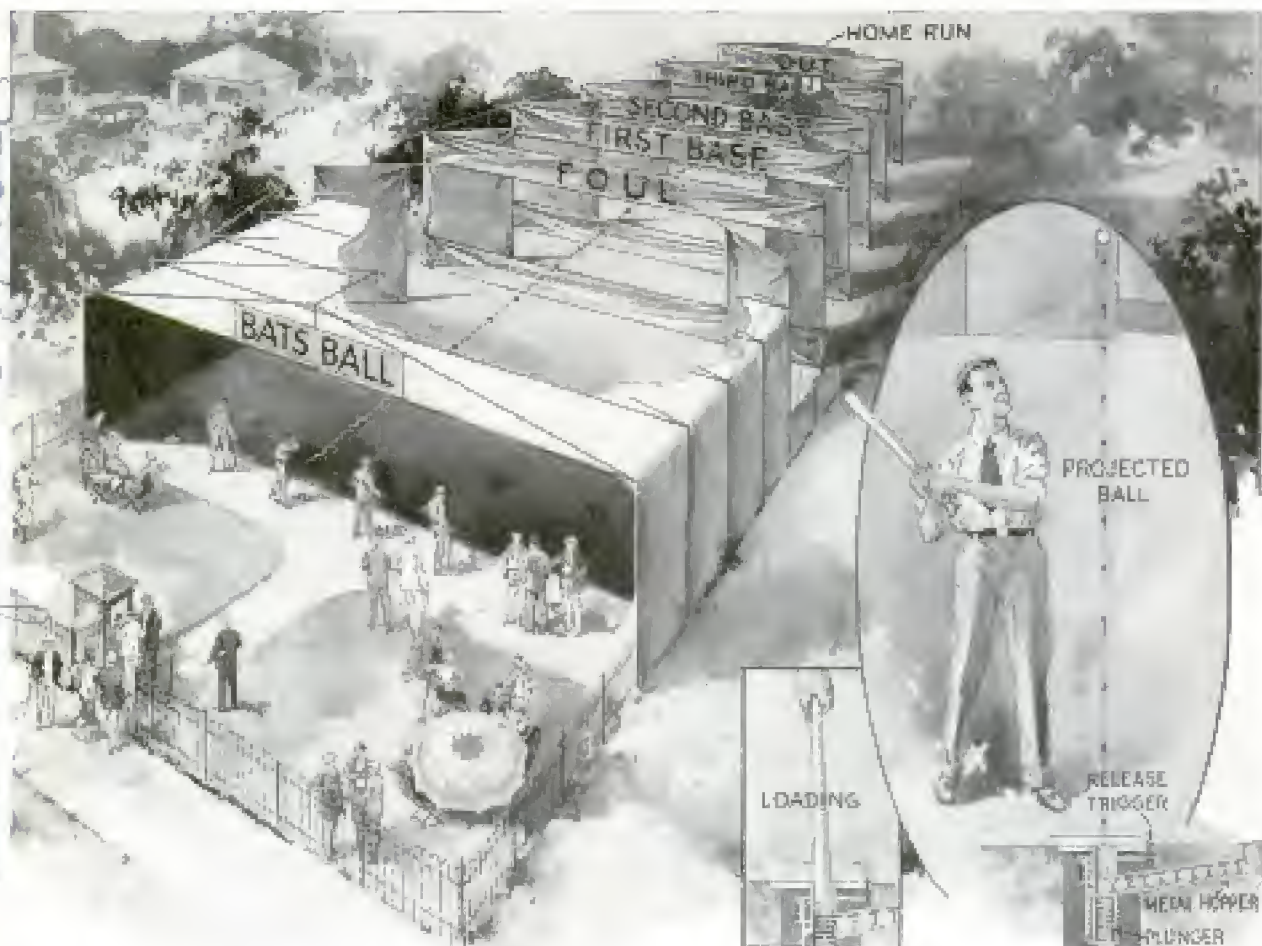
*450 Patented*



A. 640

# MIDGET BASEBALL GAME GIVES BATTING PRACTICE

James J. Harwood  
and Raymond S. Zeitler



Midget Baseball Game for Batting Practice; an Automatic Ball Tosses the Ball into the Air for the Batter to Hit through the Maze of Nets to Score a Home Run

Baseball, like golf, now has shrunk to vacant-lot size. By using a series of nets and an automatic ball-tossing arrangement, followers of this sport can enjoy batting practice on a small lot, driving a home run without danger of smashing near-by windows. The game, called "batsball," has a row of batting stands at one end, and a series of nets extending from these stands to the opposite end of the field. Home plate and pitcher's box are

combined in one unit. The baseballs are fed from a hopper into a ball-tossing machine, the batter compressing a piston in the center of the home plate to obtain a ball. The ball is tossed into the air when a trigger is pressed, and when struck, it travels through the series of nets, marked at various distances to indicate fouls, singles, two and three-base hits and home runs. The nets capture the ball, register the hit and return it to the hopper.

## SPEEDING CARS SLOW TRAFFIC LIKE LOAFING AUTOS

Driving at forty-five miles an hour slows up heavy auto traffic as much as running under ten miles an hour. This is shown in data recently compiled from tests made by a traffic committee of the American Road Builders' association. It was found that a speed of about twenty-three

and one-half miles an hour allows the greatest number of cars to use the streets in safety. The theoretical capacity of a single lane of moving vehicles varies with the speed of the cars, but at higher speeds motorists must keep farther apart, and this cuts down the number of cars the street can accommodate per hour. If cars with an average length of fourteen feet travel five miles per hour, they need keep

City Officials Adv. Scenic Service  
522. A copy 3/20/37 material



A-584

only five feet apart, and 1,380 can pass a given point in an hour. If they run at ten miles, the distance must be increased to eleven feet, making the number of cars per hour 2,100. The number of cars per hour on the street increases with the speed, but the distance between them increases also until at a little over twenty-three miles an hour, a street can accommodate 2,600 cars an hour. At higher speeds, the safe distance between cars cuts down the number of cars per hour until at forty-five miles an hour, the street can accommodate only 1,760 cars, about the number that can also be managed at seven miles an hour.



Pleasure Yacht Outfitted as a Fire-Fighting Craft: Its Pumps Can Throw 800 Gallons of Water a Minute a Distance of 175 Feet

W. A. D. World

# **BUSINESS "OFFICE" AT BEDSIDE OF CRIPPLED INVALID**

Although bedridden for years as the result of a football accident, a Rhode Island man earns his own living selling greeting cards and soliciting magazine subscriptions with the assistance of a modern "office" rigged up at his bedside. A removable table, supported by metal standards, is placed across the bed, and on it is a portable typewriter set to bring the range of type near the level of his eyes as he lies in bed, since he cannot move his head. He also has a French telephone at hand on the same table.

A-66

4237



An Invalid and His Bedside "Office," Which Includes a Desk, a Typewriter and a Telephone

Scene Service 522-A

George Leavitt Woonsocket, R. I.

# **FIRE-FIGHTING YACHT IS RUN AS A HOBBY**

Albert J. Beel

Following fire prevention as a hobby, an Atlantic City man has had constructed a private yacht equipped with waterfront fire-fighting apparatus, including pumps that can throw 800 gallons of water a minute to a distance of 175 feet. The vessel employs electricity as fuel for a modern system of heat radiation. It is powered by Diesel oil engines.

# **ATHLETICS DOES NOT AFFECT LEARNING ABILITY**

A-72

Enforced physical exercise does not affect the learning ability of adolescents, at least in the case of young rats. The ability of several groups of rats two months old to learn their way through a maze was tested recently at the University of Illinois. Some groups took part in athletics, running about a revolving cage, treadmill fashion, while others led a more quiet life. In most cases it was found the exercised rats made slightly better scores, but the difference was not great enough to be significant, and the superiority of the exercised animals did not become greater as the amount of exercise was increased. Even in the case of a group exercised five hours a day, which meant about six miles of running, this appeared to have no effect on the ability to learn their way through the maze over and over again.

Tests made by Stephen Duggan, Urbana, Ill. for Research in Athletics



a. 336

Cont. Andrew R. Bonie  
613 Spruehels Theatre Bldg  
San Diego, Calif



Drawing of the "President Hoover" Which Is Being Placed in Service This Summer; on This Ship You May Store Your Automobile in a 100-Car Garage for a Round-the-World Trip

By R. B. ANDREW

DOWN the Yangtze river, sails furled and masts lashed to their sides, Chinese junks approach the seacoast loaded with raw materials destined for the United States. On Pacific islands, copra, piled high, awaits a ship to bear it to America. Tin, cotton, ores stand ready to be poured into ships for transport to this country. In Asiatic forests crews are felling trees for American furniture.

In San Francisco bay one of the famous President line of ships is docked. Carpenters and machinists are busy cleaning and overhauling the boat. Tomorrow the ship will turn her prow toward the Golden Gate and China.

At noon today Capt. Robert Dollar, eighty-seven-year-old veteran of American shipping, comes aboard. As spryly as a young man he walks up the gangplank, descends ladders and stairs, inspects the work.

"This ship sails at four tomorrow," he tells the foreman. "I want every man to have his tools ashore by noon."

The instructions are characteristic of Captain Dollar. Since he first sent the "Newsboy," a tiny steam schooner between ports on the Pacific coast, he has believed in schedules, in keeping his word with passengers and shippers. And today he conducts the greatest individual shipping enterprise in the world. His liners sail the seven seas, calling at fourteen countries on their trips around the world.

His great shipping undertaking, which brings raw products from oriental countries to the United States, carries American-manufactured goods to other peoples around the world and transports passengers to and from our shores, sprang from a lumber business. Even before international trade was thought of as a valuable adjunct to American business, Captain Dollar was felling trees in Canadian and American forests and preparing for trade on the Pacific.

As we sat at his old-fashioned desk in his office in the San Francisco building that bears his name, Captain Dollar told





Top. One of the Forerunners of the Fast World Cruisers; Below, Captain Dollar Raising Flag on One of His Ships

me of the beginnings of his great business; how he has progressed through two mechanical eras of ships—sails and steam—and has now embarked on the third, that of electrically propelled liners. But the story properly should commence even before he sent a ship onto the high seas.

Here we have the romance and adven-

ture of the north woods, of man battling nature without the perfected mechanical aids of today. No tractors and steam engines to pull logs through the forests then, but sheer physical strength of oxen and mules, human ingenuity and Scotch determination brought timber from dense forests and paved the way for bottoms to carry goods across the waters to far-away neighbors.

First as boy worker in a stove factory, then as roustabout in a lumber camp, cook, roadbuilder with oxen and horses, again as clerk, now foreman, later as owner of timber lands and finally ship operator, he progressed to his present position of the greatest individual ship operator in the world.

"In 1880 I started to get out square timber for the British market," he explained, "and became much interested in foreign trade. In those days it was quite an undertaking and required considerable grit and energy to carry through that kind of business. I wanted to increase my lumber business. To do this, I decided to transport my lumber in my own ships. I bought the 'Newsboy,' a small schooner with a capacity of 250,000 feet of lumber. That was my first venture into shipping. It turned out well and I bought more



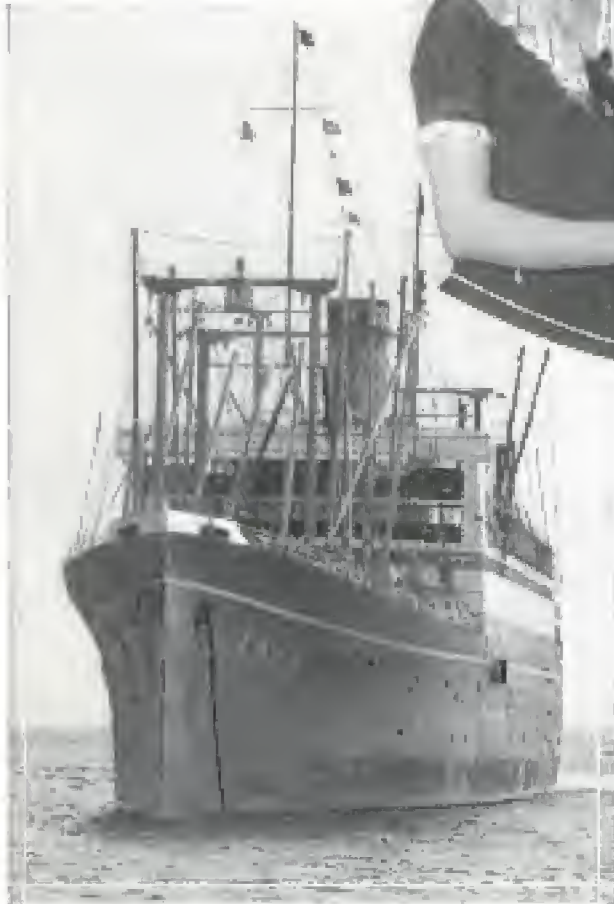


Bow of the "President Hoover." Showing the Section That Will Be under the Water; the Bulbous Bow Adds Materially to the Boat's Speed and Helps to Make Fast World Tours Possible



boats as they were needed.

Three decades ago a 6,000-ton deadweight ship with a twelve-knot speed was about right. Now the ships are more



Captain Dollar Tracing a Round-the-World Route; and, Below, the King-Post System for Handling Freight on the "President Grant"

than twice as large and nearly twice as fast. Sailing vessels have virtually passed.

"Shipbuilding and ship owning," Captain Dollar said, "is in a constant state of evolution and unless we keep up to date we become a back number. A modern ship is no sooner completed than someone builds a better and more economical one. At one time we had the one-cylinder condensing engine. This was followed by the two-cylinder compound, which we thought perfection in the way of economy; and then the triple-expansion engine was invented. It uses the steam three times. The turbine came and with it fast steamers. As soon as the turbine was perfected, along comes the electrical ship, with huge motors turning the propellers. Again, this looks like perfection—but to-

morrow may bring us something new.

"Within my recollection the first Atlantic cable was laid; the telephone was introduced; wireless has been developed—today I can communicate with our captains anywhere in the world on our private radio system. Improvements in the use of steam have been very great. The propeller has been introduced since I was a boy and has superseded the paddle steamer. In the early days every steamer was fitted with sails and partly depended on them for propulsion. Now we do not see a sail on any steamer. Electricity, manufactured by steam turbines turning dynamos, propels our newer liners at speeds inconceivable twenty years ago."

While he has been creating trade, Captain Dollar has seen shipping on the Pacific grow to justify his prediction that in a few years the world's commerce will center on its waters. Little more than four decades ago one company had four ships on the Pacific coast and those ships aggregated 10,000 tons. Today the ships engaged in commerce on the Pacific have a capacity one hundred times as great.

"We are just getting started," Captain Dollar commented. "Imagine the tremendous amount of commerce coming."

What is he doing to prepare for a revival of shipping? Building the largest and most palatial liners yet manufactured in an American shipyard. The S.S. "President Hoover," recently launched, and the "President Coolidge," will join the mighty



Dollar fleet in a few months. Captain Dollar poured \$16,000,000 into these huge passenger ships.

From a strictly mechanical viewpoint, these liners will surpass any yet to cross an ocean. On them you may park your automobile in a 100-car garage and carry it with you around the world, swim, bask in warm sunlight on an artificial sand beach,



Kitchen of the "President Hoover," and, Below, Small Radio Intended for Use in a Lifeboat

work out in a gymnasium, attend talking movies or watch the stock ticker, dance or sip tea in a tea room. All the conveniences of a metropolitan hotel will go to sea on these electric liners. For the first time, also, the "President Hoover" will have a bath attached to every room aboard.

When Captain Dollar was considering these ships, he laid out the plans on the large table in his office and asked his aides for suggestions. He said to his son Stanley, "I note we plan a bath for every room. Why not some cheaper rooms?"

"We are building for people who will be traveling in 1945," Stanley replied.

"Gentlemen," remarked Captain Dollar; "will not this come true? In another ten years women will demand not only a bath, but a separate bath for themselves. Will we not be compelled to provide



two bathrooms with every state room?"

The "President Hoover," 653 feet long, is the forerunner of four queens of the sea. When she was christened recently, Mrs. Hoover broke a bottle containing water from the seven seas over her bow. It was the first time in history a president's wife had sponsored a ship in honor of her husband.

Not all is show on these floating palaces, however. To increase the safety of these vessels, nearly six times as long as the "Newsboy," foundation of the present Dollar fleet, all water-tight compartment doors will be electrically controlled from the bridge. In event of accident, all water-tight doors can be closed in less than a half minute. Electrically operated boat davits will insure greater safety in launching lifeboats. Even radio sets in the lifeboats themselves would enable stranded passengers to call for help and report their positions.

"Have shipbuilders and science reached the limits of size, speed, luxury and safety in these ships?" I asked Captain Dollar.

"Possibly some people think we never will have larger ships," he said, "but we thought that twenty years ago. I started with a little schooner with a single boiler. If we blew the whistle, it was almost necessary to stop the boat and wait for the steam pressure to rise again. Her



a. 5 79

wooden hull would not withstand the long voyages of today. But steel has taken the place of wood, and steam, instead of turning propellers, turns generators, and we ask electricity, which is untiring, to shoulder the burden.

"Size and speed in ships are progressive, from one step to another. Both are gradually creeping up. The 'Great Eastern,' built when I was a boy, failed because she was too large for the needs of the day. People simply were not accustomed to her. Each new ship stretches a little longer and towers a little higher and runs a little faster than her predecessor. Our smallest ocean-going ships are larger than the largest of forty years ago. If some more economical and more powerful engine than turbines and motors is devised, larger ships will be built. Where the limit is no one can say."

With the eagerness of a boy, Captain Dollar awaits his beautiful "queens of the sea." At eighty-seven he continues to plan ahead for larger ships to carry the Stars and Stripes across the seven seas with messages of friendliness and commerce to the nations of the world.

LEAK-PROOF PIPE CONNECTION IS WITHOUT THREADS

One of the latest developments in pipe fittings is a threadless brass connection that makes the production of leak-proof joints in copper water pipes a simple matter. Instead of threads, the connector has



a shallow groove around the inside surface of each pipe opening. On the outside, over the groove, are several punch marks so a hole can be drilled through the fitting conveniently. In assembling a joint, one such hole is drilled, the end of the pipe is cleaned and smeared with a small quantity of soldering flux, and is inserted into the opening. With a blowtorch, the joint is heated and wire solder, introduced through the hole, is permitted to flow throughout the joint. The result is a connection mechanically stronger than ordinary types, which can be loosened only by heating until the solder melts.

Mueller Brass Co.  
Port Huron, Mich.



Hand Truck with a Semicircular Arm Which Holds a Sack Open, Thus Making Filling Easy

HAND TRUCK HOLDS BAG OPEN TO MAKE FILLING EASY

Filling gunny sacks is simplified with a hand truck which contains a semicircular arm attached to the truck handles to hold the mouth of the bag open. The top of the sack is attached to five clamps, and after the container is filled, it can be wheeled away.

VIBRATION TEST FOR BATTERIES MADE ON JOLTING STAND

One British battery manufacturer submits his batteries to severe vibration, bumping, overcharging and heat tests on a revolving turntable which in a few hours gives a battery more abuse than it would experience in an automobile in many months. The batteries are carried in pivoted cradles under which revolves a turntable with many uneven projections over which the cradles bump. While the batteries are pitching and jolting over the table, they are heated and greatly overcharged. By the tests weak points are discovered and experiments with improvements conducted.



By the tests weak points are discovered and experiments with improvements conducted.

Lucas, Ltd.  
Great King St.  
Birmingham, Eng.

Chicago-129 S. Jefferson

Chicago-129 S. Jefferson

Chicago-129 S. Jefferson  
1928 ed. 46 My Chicago

No. 8 Sagard Kennerly



A. 669

904

Test conducted by  
Southern California Edison Co  
POPULAR MECHANICS

# ELECTRICITY IN GROUND FORCES PLANT GROWTH



Unheated Vine 32 Days Old



Heated Vine 16 Days Old



Garden Plot Heated by Electricity near End of Growing Season; Note Size of Cucumbers; Above Are Contrasts between Plants Growing in Unheated Ground and in a Heated Plot

While electricity as a heating agent in the home is familiar to most of us, its use to heat the ground and thus force out-of-season crops is a new idea. There has just been completed in southern California an experiment along this line. A series of wires were placed under the ground, one to each row of plants, and an electric current sent through them. The heating action of the current served to force the growth of the plants and matured the crop many days ahead of the usual time required. Two one-tenth-acre plots of ground were used, one wired and the other unwired, each to serve as a check against the other. Comparison of crops from each plot enabled the experimenters to gain much valuable information. Both plots were planted on the same early spring day, and all gardening duties were performed at the same time and in an identical manner. A thermostat was put into the circuit to keep the temperature at seventy degrees Fahrenheit.

During the day, the sun kept the heat at the required value, and the thermostat kept the switch set so that no current flowed in the wires. During the night, however, the ground temperature often fell to forty-five or fifty degrees in the unwired plot, but in the other plot the thermostat kept just enough current flowing to maintain an even seventy-degree temperature. It was decided to plant the plots to cucumbers for they mature rapidly and require only a minimum of care. Four days after planting, the advantage of the wired over the unwired soil was apparent. After sixteen days in the ground, the heated plants showed twice as much development as the unheated ones. Over one-half the crop from the heated plot had been matured and marketed before the cucumbers in the other had ripened. During the forty-one days of the experiment, about \$40 worth of electric current was consumed. The owner realized a bit over \$300 from the heated

in the form of I. Matilda  
Japanese Truck Gardener.

under direction of  
George Hawley  
and several heating exp.

Ant. Lardon S. Mitchell  
Hollywood Calif 8 1/4 La Brea Ave.  
Watson Station  
75 miles south of Fresno  
Copyrighted material



*Cont. Hunt. Hunt. Begin*  
*Avenue, Jr. 286 Kennedy*  
*Av. POPULAR MECHANICS*  
*slayton Ohio*

905

plot, as against \$150 from the unheated. Deducting \$40 for heating current, the wired plot showed a net gain of over \$110. The cost of installation and material for wiring the tenth-acre plot was nearly \$100. Even deducting this cost, the experiment showed an over-all profit of about \$10. However, it was pointed out, this initial cost ought not to be charged up to the first crop, inasmuch as installation of wiring would not be necessary after every harvest, were the experiment put on an actual production basis.

### TOXIN CAUSING BODY FATIGUE COUNTERACTED BY SERUM

Fatigue is caused by the formation of a poison or toxin in the muscles of the body, according to a *Leipsic doctor* who has identified and named the poison "Kantoxin." When this substance was isolated and injected into animals, the doctor found that they tired quickly if kept on the move, although, if a very small amount was used, it appeared to increase endurance. By experimenting with the serum, he developed an antitoxin known as "antikenatoxin." This substance, injected under the skin appeared to increase energy, and seemed also to have the same effect among pupils in a schoolroom when sprayed about the room.

### BOOK LIKE A POSTAGE STAMP HAS LINCOLN ADDRESSES

Four of Abraham Lincoln's principal addresses are contained in a diminutive volume little larger than a postage stamp. This tiny leather-bound book, of 150 pages, has leaves half an inch wide and three-quarters of an inch long.



Book Little Larger Than a Postage Stamp Which Contains Four of Abraham Lincoln's Addresses



Dial System for Remote Control of Radio: Number Combinations Bring in Different Stations

### DIAL SYSTEM CONTROLS RADIO BY NUMBER COMBINATIONS

Remote control of the radio now is possible with a dial system, similar to that used in dialing numbers on automatic telephones. By dialing simple number combinations, radio programs and recorded music can be brought into different rooms of a home from a master radio-phonograph outfit installed in attic or basement. The dial control is mounted on a small ornamental box with pilot light and is installed at desirable locations throughout the house, providing complete operating control of both the radio and phonograph. Up to eighteen different stations are pre-tuned and adjusted to the master dial unit, to respond to easy code-number combinations, and the automatic phonograph is similarly adjusted. To bring in a radio program to one of the rooms, the dial is twirled to the code number of the desired station. In the same way, a code number is dialed to raise or lower volume, start or stop radio music and to play records or reject them. The volume of each loud speaker may be separately regulated by any of the dial controls. The code numbers are conveniently listed in the lid of each control box. For the phonograph, the code number of the record-changing device is dialed, and the machine plays a continuous program of twelve records.

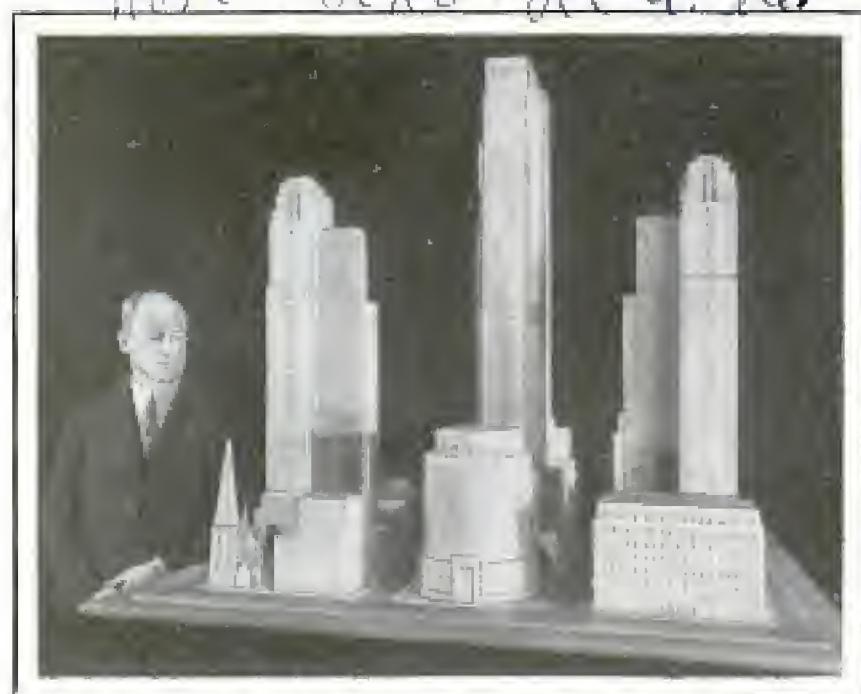
*a-6907*  
*Victor Co. Inc. Camden, N.J.*

*no further data*

*Owned by P. W. G.*  
*Ditz Simmons, Leetrip*



# **"RADIO CITY" WILL COVER A DOZEN CITY BLOCKS**



Model of "Radio City," a \$250,000,000 New York Structure Which Will House Various Branches of Radio Industry, Theaters and Offices

city," the largest building in the metropolis, although not the tallest. More than 300 buildings are being torn down to make room for the mammoth structure, which will house 50,000 persons, cover a dozen city blocks and provide headquarters for the National Broadcasting company, picture and vaudeville theaters, a television station and the Radio Corporation of America. In addition, the structure will contain a bank, stores and offices and may include an opera building. Even a church will be within the limits of this radio city, al-

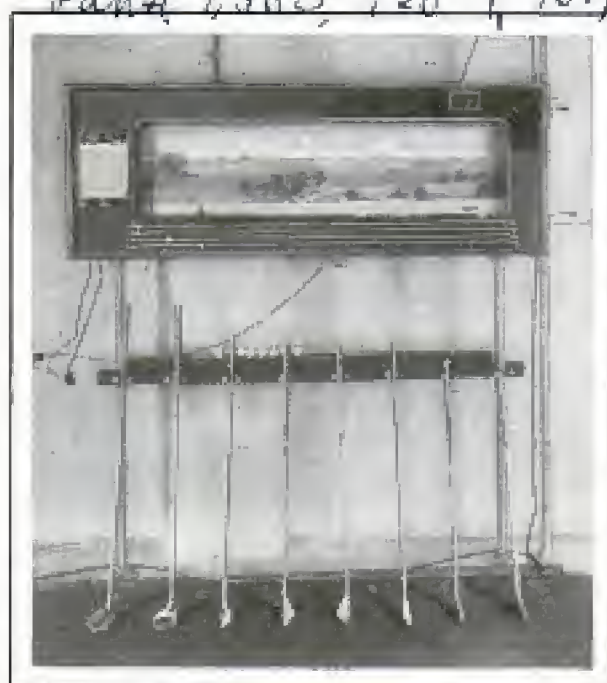
though not a part of it. The building will have 2,000,000 square feet of floor space and is expected to be completed by 1934.

though not a part of it. The building will have 2,000,000 square feet of floor space and is expected to be completed by 1934.

## **ELECTRIC GOLF COURSE GIVES 70 THRILLS OF REAL GAME**

Nine holes of golf are offered on an electrically operated course, only twelve feet wide and nineteen feet long, that gives an opportunity to use every club in the bag. The concentrated game can be set up indoors or outdoors and combines some of the features of the big game, miniature golf and the driving range. The course is surrounded by sides and top of netting, and the ball is driven at a screen containing a picture of a fairway, the distance being registered on a chart. This is operated by turning a crank and contains nine holes with picture, description and yardage for each. Driving, approach and chip shots are made, the electric scorer registering the length of each. When the scorer indicates that the green has been reached, the player putts into a hole on the course after placing his ball at the distance from the hole indicated by the chart. Penalties are provided for out-of-bounds shots and shots into the rough,

indicated by the space around the screen. Balls of different colors used in keeping score enable the playing of a foursome.



Scoring Chart on Which Is Registered Distance of Each Drive on an Electric Golf Course

*Peter Clark, d.m.*  
*544 W 30th*  
*New York City*

*Electrolinhs, Ford*  
*Hartford Western Sales*  
*manager 2937 N. Clark Chicago*



50.  $\frac{1}{2}$

Mr. Everett Spring, Bureau of Census, Wash.

Up tool attac  
\$2.50

## CUTTING STEEL WITH WATER IN PRESSURE MACHINE

Dr. by professor at Harvard.  
no further any

Q. 7/8

to make a pound.  
 Con. Lieut. Hon. Benji  
 Owens, Jr. 286 Kennard  
 Ave. Dayton, O.



A. 508

Bullock's Walshire  
Los Angeles Calif

# DRESSING



Above, "Buddy," a \$300 a Week Canine Movie Star Registering a Dog's Idea of Contentment in His Portable Wicker Kennel; beside Him is "Nixie" in an Imported Orange Sweater

Leading a Dog's Life Has Its Compensations if the Canine Happens to Be Picked for a Movie Career, as Indicated by the Accompanying Pictures of Movie Dogs and the Many Accessories to Keep Them Comfortable: Below, for Instance, Is "Toto," a Toy French Poodle, Enjoying a Marvel Preliminary to an Appearance before the Critical Eye of the Camera



Above, Here Is a Stylish Poodle Showing Common "Mutts" What the Well-Dressed Movie Dog Wears; the Garment Is a French Creation, an Imported Cape and Hood of Soft Flannel in the Latest Scotch-Plaid Pattern; Note the Glassy Button Shoes to Complete the Ensemble



Carl A. L. Thackwell, Los Angeles  
354 S. Spring, Calif



9-508

# UP the DOG



One of the Latest Creations for Dogs Is the Zipper Bag, Shown Above, Which Serves Several Purposes, Aside from Keeping Fido Warm When He Snoozes; Here Is a Movie Actor in the Bag in the Midst of a Delousing Operation; the Garment Also Is Used for a Rubdown



Actors in the Movies Must Be Made Up for the Camera with Meticulous Care; Above Is "Mutt" in the Throes of a Manicure, and Apparently Rather Bored with the Operation



Bootees for Bow-Wows Are the Latest in Dog Fashions; Above Is a French Poodle Modeling Imported Rubber Bootees Which Are Buttoned On; They Are Worn in the House to Keep the Rugs Clean After the Dog Has Been for a Walk; Next to "Boots" Is a Puppy Munching a Very Synthetic Rubber Dog Biscuit Which Answers the Same Purpose as the Baby's Teething Ring; Right, a Pomeranian at Ease in a Padded Wicker-Basket Dog Lounge



\$ 7.00 for 4  
med. doggy

Von Lengerke & Antoinette  
33 S. Wabash. Chicago

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Q. 500  
910

Cont. Editor Street  
p. 877.  
Savannah Ga.



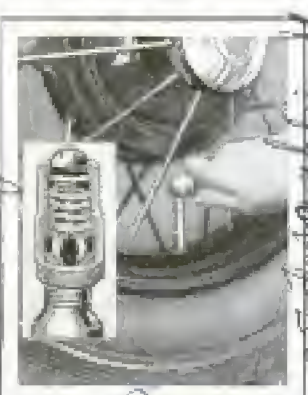
Vessel of Scouting Fleet Throwing Out a Smoke Screen to Conceal the U. S. Airplane Carrier "Lexington" during Navy Maneuvers

### SMOKE SCREEN LAID BY FLEET HIDES PLANE CARRIER

Smoke screens prove an effective means of concealing vulnerable vessels or those moving into position for attack in modern naval fighting, and a splendid demonstration of the use of such a screen was given during recent navy maneuvers off Panama. The U.S.S. "Cincinnati," of the scouting fleet, threw a cloud of thick black smoke from its funnels which hid from sight of "enemy" planes and ships the "Lexington," the navy's airplane carrier, and its complement of seaplanes.

### TIRES INFLATED THROUGH CAPS OF AUTOMATIC VALVES

Automobile-tire inflation and testing is simplified by the use of automatic valve caps which need not be removed for either operation. This device has a valve built into the cap itself and replaces both the dust cap and the inside cap on the tire. The old caps are discarded and the



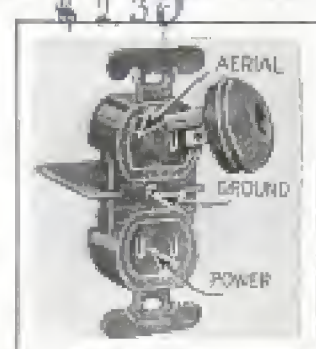
automatic caps are screwed on in their stead. The tire then can be inflated by placing the air hose chuck on top of the valve cap, and pressure is tested in the same way. The caps are rust, dust and water-proof.

### STEAMING COFFEE CUP ADVERTISES COFFEE SHOP

Steam is used to lend a touch of realism to a large electric sign representing a coffee cup erected to call attention to a coffee shop. A pipe from the steam-heating plant extends to the top of the coffee cup and is there pierced by tiny holes through which the steam issues, eddying above the cup with the wind, the vapor giving the impression of heat and lending an air of tempting, almost aromatic reality.

### SINGLE RADIO OUTLET UNITES POWER, AERIAL AND GROUND

Power, aerial and ground connections for the electric radio receiver are contained in a single outlet now available. It is of bakelite and will fit any standard wall box and plate to harmonize with other electric fixtures. The outlet eliminates surface wires and is fool-proof, since all connections are plainly marked, and aerial and ground slots are set at an angle, to distinguish them from the power slot, which takes a standard plug, while a special plug with angled blades is needed for the other slots.



Names and addresses of manufacturers of articles described in this magazine will be promptly furnished, free, by our Bureau of Information.

Q. 684  
\$1.00 for 5  
Sterling Automobile  
Products Co. 760 Massachusetts  
Rte. 23 Buffalo, N.Y.

Arrows, Harl & Hegeman  
Electric Co Hartford Conn



A-665

James S. Stenbridge

POPULAR MECHANICS

911

Hollywood

SUPPLYING FIREARMS OF ALL AGES TO THE MOVIES

Calif



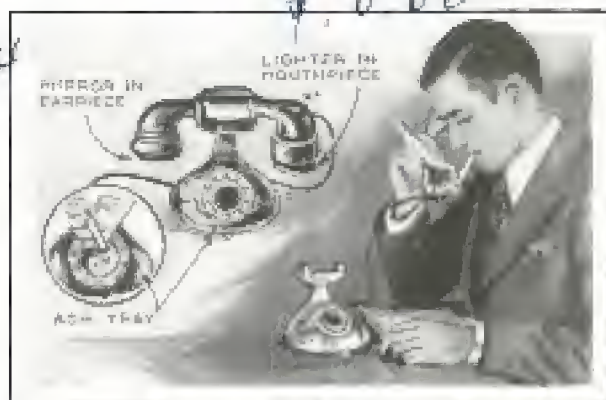
Firearms for the Movies Come from This Collection: Above Are Some of the Hundreds of Guns of All Makes and Periods, from Which Weapons Can Be Selected to Outfit an Entire Movie Army

Guns and pistols sufficient to supply a small army, each specimen historically accurate, are owned by a Hollywood firearms collector who supplies the movies with any kind of weapon from an old flintlock gun to a modern sub-machine rifle. About 7,000 pieces are included in the collection of guns, pistols, machine guns, field pieces, swords and bayonets. In the armory are weapons of every period and from all the countries of the world. The epochal periods in American history are represented by corresponding firearms in volume in order to supply the large number of extras appearing in his-

torical productions. These guns graduate from the old smooth-bore of the days of the Pilgrim fathers to the regulation army rifles used in the world war. Machine guns of every make ever used are included and are equipped for mounting in trenches, on carriages or in airplanes. Ammunition for all the pieces is also kept on hand, this including about 300,000 rounds of blank cartridges. There is even a comedy gun for the slapstick picture, a shotgun with an S-shaped stock to enable a man blind in the right eye to sight with his left eye while firing from the right shoulder.

### CIGAR LIGHTER IS LIKE PHONE AND HAS ASH RECEIVER

Cigar lighter, ash receiver and mirror are combined in a smoking set for the desk that resembles a French telephone. The electric lighter is plugged into a wall socket and glows instantly when the "phone" is removed from the holder and a switch is pressed. The lighter is in the mouthpiece and the mirror in the receiving section. In the base is the ash tray, which is easily removed for cleaning. The desk set is finished in bright chromium.



Cigar Lighter, Ash Tray and Mirror Are Contained in This Telephone Smoking Set for the Desk

The Ad. Lee Co.

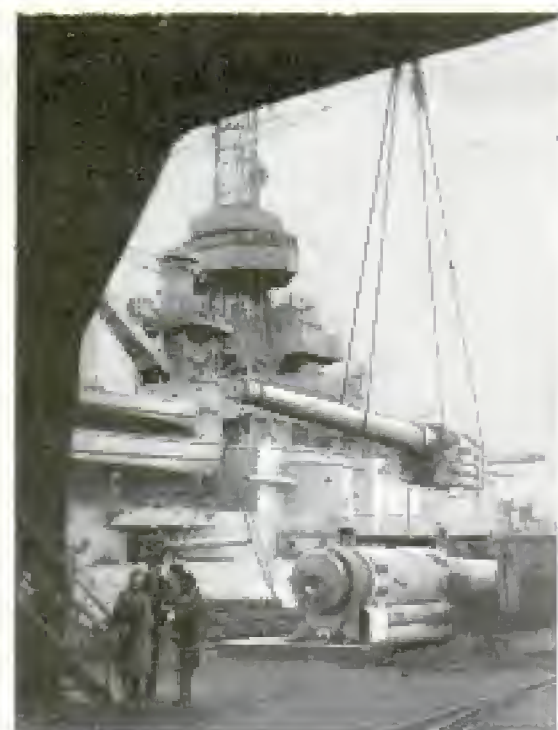
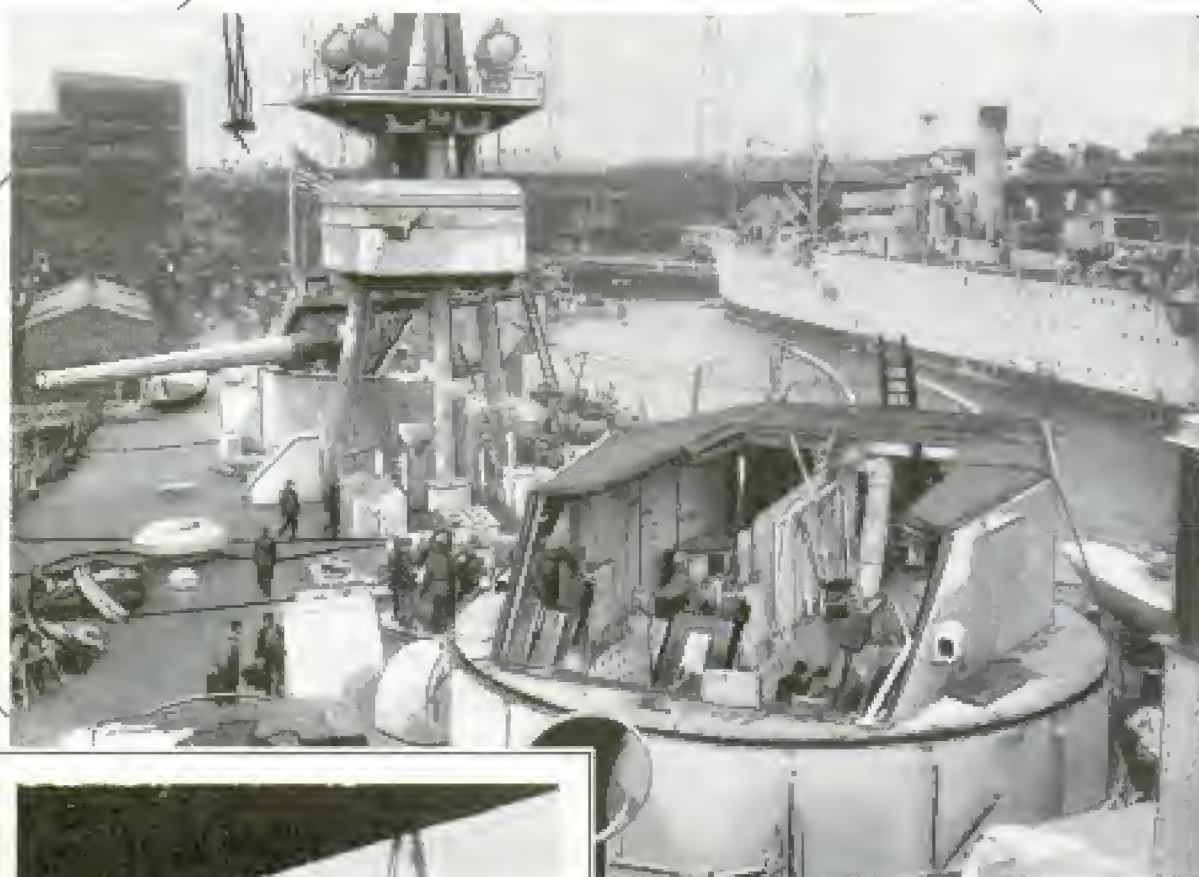
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Chicago



# DISARMING ONE OF UNCLE SAM'S BIG BATTLESHIPS



Removing the Guns and Turrets from a Battleship Preparatory to Making Training Ship of It

Frisking a big battleship for weapons, is a job that requires a large force of men, particularly if a dreadnaught is to be disarmed. The process was started recently on the U.S.S. "Wyoming," in the

navy yard at Philadelphia. After its guns and turrets have been removed, the boat will be used as a training ship by midshipmen of the United States naval academy.

## FAMOUS BURNING MINE AFIRE FOR THIRTY-SIX YEARS

For more than thirty-six years an ore mine near Clarksdale, Ariz., has been burning continuously. In an effort to cool it off and make it as safe as possible for working, a well has been built around the 700-foot furnace which constitutes the mine. From this well steam is constantly escaping as the water is heated by the close contact with the mine walls. Ore is gathered 1,500 feet beneath the surface by miners working in another shaft, but the sides often become so hot that the miners must stand on wooden flooring to avoid discomfort. Blasting powder taken into the mine is carried in asbestos sacks because of the heat. The ore is loaded on a train 1,000 feet below surface level and hauled eleven miles to the smelters.

United Verde

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A. 720  
Cont. L. 11m O'Brien Owens,



Harl & Hegeman A. 568

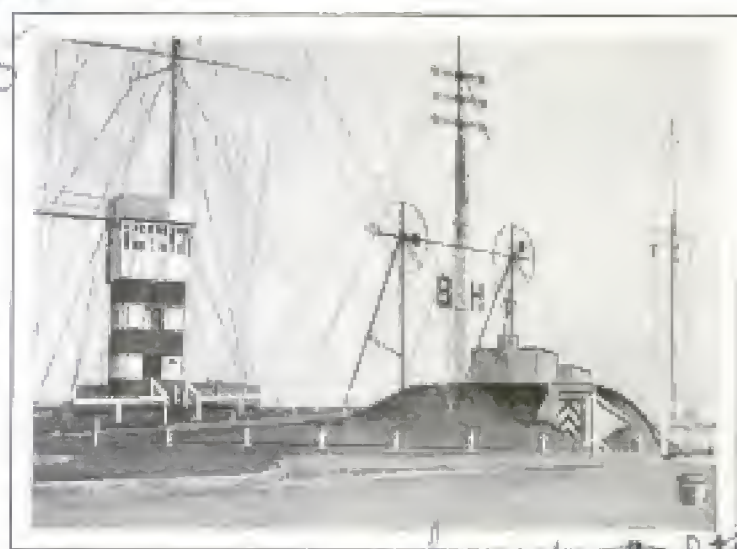
Electric

Hartford Conn

**HIGH-VOLTAGE TOGGLE SWITCH FREE FROM ARCKING**

A 655

Most of the danger of short circuits or arcking is eliminated in a toggle switch which has no blades, screws or nuts in its movable make-up that can come loose. The body is made of bakelite strips, and the piece that takes the place of the switch blade is really a brass barrel that moves on the bakelite runway and makes contact with the solidly riveted terminals. The switch is about one-fourth the size of the ordinary kind, making it useful for panel work where space is at a premium. It is as durable as those made of metal and is easily installed, since there are no adjustments. The size and simplicity make it useful for radio and model workers, as it can be employed for voltages up to 220.

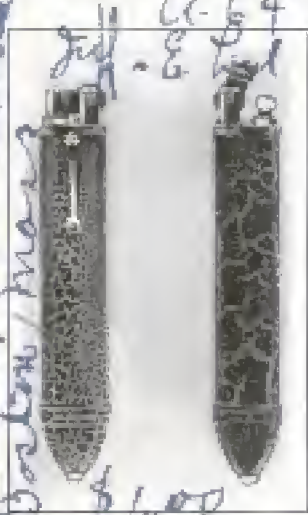


©Press-Photo Gesellschaft  
German Radio Station Which Broadcasts Medical Advice to Ships at Sea If Member of Crew or Passenger Is Ill

**MEDICAL ADVICE SENT SHIPS BY RADIO STATION**

When a passenger or member of a crew of a ship at sea becomes ill, the commander of the vessel or those caring for the sick may obtain expert medical advice by radio by applying to a station at Cuxhaven, on the North sea, Germany. This station is under control of the German post office department and is specially equipped for giving medical information to ships applying for it. The message for aid is made by radio telegram or phone, and the staff of the Hamburg state hospital supplies the information.

**FOUNTAIN-PEN CIGAR LIGHTER FITTED WITH POCKET CLIP**



Equipped with a pocket clip, a slender, flat cigar lighter fits in the vest pocket like a fountain pen where it is always handy but not in the way. It lights with one hand and a filler screw makes it easy to refill, the liquid container holding a week's supply.

**POLISHED COVERS FOR SPOKES OF WIRE AUTO WHEELS**

A. 632

Snap-on covers of bright, stainless steel for the spokes of wire auto wheels add beauty and distinction to the car. The bright spokes snap over the original wire ones, covering the visible portion of each one. There are no clips or fasteners, and it is claimed the decorative spokes will not rattle or come off and that dirt does not adhere to the surfaces.



**STAINLESS MINERAL OIL FOUND FOR KNITTING MACHINES**

Since it is not practicable to keep the oil off the fabric, the hosiery and underwear industries asked the bureau of standards to find a stainless oil for lubricating knitting machines. After studying the action of various oils on samples, the bureau recently discovered that a mineral-oil lubricant is suitable for the machines and will not stain cloth.

Dept of Commerce  
3/2/31

Bridgely Wheel Co.  
1274 1 & 2  
sectors. Much

Waterman, 558 Littleton, 617 W Jackson, Chicago

Ill. Low. m. Change day. Railway to

pat pend

Chicago. 4148 340





Arch Bridge for Pedestrians in Germany; It Is Constructed of Concrete and Has a Floor of Concrete Steps Which Flatten at Top

### ARCH BRIDGE FOR PEDESTRIANS HAS A FLOOR OF STEPS

Built entirely of concrete, a high arch bridge for pedestrians, recently completed in Neu Roessen, Germany, is attracting the attention of many engineers because of its steep arch and unusual construction. The floor consists of a series of concrete steps, gradually flattening at the top of the arch, in order to facilitate the crossing of the bridge.

### POISON-GAS DETECTOR SOUGHT FOR USE IN NEXT WAR

A. 645  
Several devices intended to detect yperite, or mustard gas, terror of the trenches in the world war, are to be tested soon in Paris. The International Red Cross has offered a prize for the most efficient detector of the poison gas in small atmospheric concentrations, its jury of award including Dr. Fritz Haber who helped make chemical warfare an effective part of modern battle in the world war. The Red Cross also expects to offer two other prizes, one for the best anti-gas mask and the other for large-scale shelters against poison gas, in line with a campaign for protection of civilians against chemical warfare in future wars. Mustard gas has been difficult to com-

bat because mere contact with the soil or contaminated objects, as much as two or three days after the attack, is sufficient for a gas case to develop. An odor of mustard is all that first gives warning, but in four to six hours the victim suffers temporary blindness, suffocation, burning and blistering, the retarded effects being due to the fact that yperite is projected as droplets and not in gaseous form. Mustard gas requires protective clothing as well as a gas mask, for it permeates cloth.

The ideal detector, still being sought, must be sensitive enough to signal even a feeble trace of the gas, and function rapidly enough to allow time for self-protection. It must also be easily handled and sufficiently inconspicuous to be placed in front of the lines if necessary.

### HIDDEN REEFS IN OCEAN FOUND BY SIGNALS ON CABLE

A. 504  
Hidden reefs on the bottom of the ocean that may prove a menace to navigation are located with an apparatus consisting essentially of signal devices attached to a submarine cable. The cable, stretched between two vessels, is dragged from twenty to sixty feet beneath the water. If it strikes an impediment, a signal is at once given.



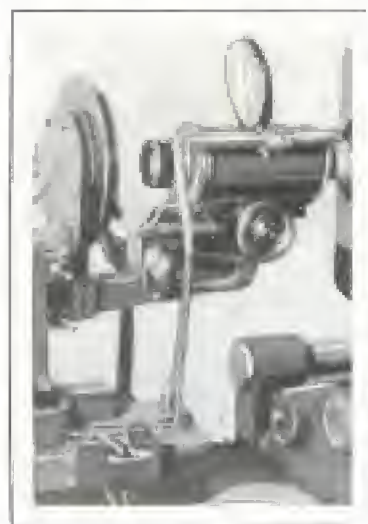
Drawing Showing How Hidden Reefs Are Located by Signal Devices Attached to Cable Stretched between Two Ships

Source Service 520 - 10  
3/12/31

Herbert  
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## NEW WONDERS OF NATURE ARE REVEALED BY LENS



Mirror and Lens Arrangement of Photographic Outfit for Making Large Pictures of Microscopic Objects, and Example of Such a Picture.

Microscopic objects, including animal and plant life, now can be photographed up to 200 times their natural size by a method developed by L. G. Pratt, of the department of agriculture. Heretofore the direct photography of such subjects at more than ten or fifteen diameters has been considered all but impossible on account of the lack of sufficient illumination. Also long-focus lenses, to give depth, could not be used at high magnification. Mr. Pratt's new machine utilizes for illumination the rays from an arc lamp, passing through a condenser into a concave mirror from which the rays are reflected back on the specimen. The entire candlepower of the arc, intensified by the condenser, is further concentrated by the mirror on a spot one-half inch in diameter, the rays

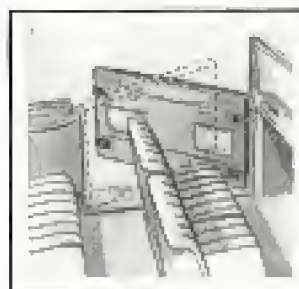


being passed through a water cell to eliminate heat. "By removing the front of the telescope and fashioning an appropriate lens ring, a seventy-two-millimeter lens can be used," explains Mr. Pratt. "The extra distance for focusing is obtained by removing the substage condenser and placing the specimen at the rear of the opening. By making a tube to take a No. 4 eyepiece, accurate photographs, having considerable depth, of specimens can be taken as high as sixty diameters."

## DOUBLE-DUTY CAR DOOR OPENS FROM EITHER END

For close-coupled automobile bodies that require very wide doors, an Italian manufacturer has made a door that opens from either end, although it is not pivoted in any way. The door is provided with a special form of lock on each side which acts also as a hinge. There are two locks at each end, the pair working together. When one side of the door is pulled, the action automatically causes the locks on the opposite side to become hinges. The

front and rear sets of locks are interconnected, so that, on opening one side, the



opposite locks automatically are set in safety position, rendering it impossible for the door to be detached accidentally. This safety arrangement can be made inoperative

by pressing a button on the lock which allows the door to be lifted out.

Carrozzeria Moderna S. A.  
8 via Broletto, Torino, Italy

Auth. J. of Am. 2/22/21

24 11 1921

Copy of original material



Ex. 29. Clear Road Colony. Berley Hall  
in London Eng



Above, Arab Turning to Mecca to Pray at Sunset; Below, Arab Students Studying Radio in England Preparatory to Using It in Arabia

© Express Photos

By HAROLD T. WILKINS

"DOT-dot! Dash-dash-dash! Dot-dot-dash!" The staccato signals came from the wireless of a rakish-looking British warship, recently lying at anchor at the head of the Persian gulf, close to Kuwait in the dominion of Sultan Ibn-Muharak, Arab ruler.

"Sparks," in the radio cabin of the warship, intently listened for an answer. The hurried ship's code sped on the wings of radio up the valley of the Euphrates of father Abraham, till it beat on the walls

of Bagdad. It radiated far westward into the unknown regions of the great Arabian desert of the Nejd, hot and thirsty land of the fierce, Kafir-hating camel riders of the Akwan.

"No answer!" Sparks called to the commander.

"Broadcast every twenty minutes till you get a reply," came back the order. Sparks again put on his headphones, and tapped the keys.

"H.M.S. 'Daffodil' calling. Kuwait. Where are you, Royal Air Force armored-car patrol? Headquarters anxious hear from you."

Three days before, in response to an urgent radio flashed to the British Royal Air Force headquarters at Basra from Rutbah Wells, the new airdrome station on the Imperial Airways line and desert mail automobile route across the Arabian desert to the Mediterranean port of Beirut and the Suez canal, a squadron of armored cars, with two flights of airplanes scouting ahead of them, had hurriedly left Kuwait for the unknown interior of the vast desert of the Arabian Nejd. The





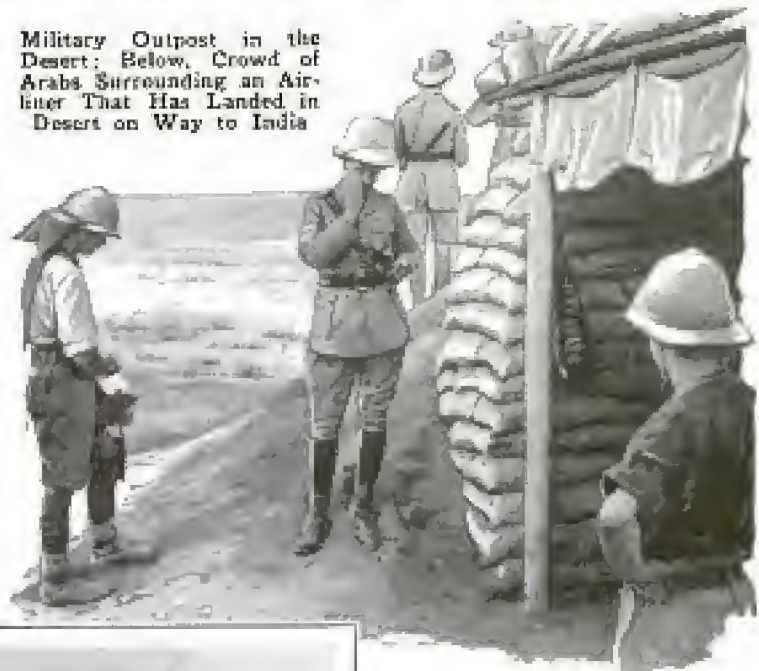
Courtesy Imperial War Museum

**An Armored Car Patrolling the Lonely Desert in Arabia to Protect Caravans from the Attacks of Marauders; the Car Can Withstand Any Attack Likely to Be Made by Desert Prowlers**

message read: "Akwan out again. Hundreds of them trekking for Al Hafar."

Riding out from their fastnesses in the unexplored south Arabian wastes, these tribesmen, who live for war, were out to collect all available camels, horses, sheep, and valuable property and food that might be found in the less warlike towns and villages just over the border in Irak, or Mesopotamia. These white-burnoused warriors, astride fast camels, are armed with the best modern rifles which they aim straight from the saddle. Their quick-trotting cam-

**Military Outpost in the Desert: Below, Crowd of Arabs Surrounding an Airliner That Has Landed in Desert on Way to India**



els get over the desert at a rate of about six miles an hour. Equipped with radio to keep in touch with air-force headquarters and with the British naval patrol of warships in the Persian gulf, the armored cars were racing to get to the well of Al Hafar first. Ahead of the armored squad-

Courtesy Imperial Airways





Courtesy Royal Air Force

A Squadron of Royal Air Force Bombers Flying in Formation as They Return from Police Operations in the Wilds of the Orient

ron went the commander's car, steering across the trackless sea of sand by the aircraft compass in the top of the turret, which was loopholed for the fire of machine guns. The armored cars carry rations and water for about seven days, and enough gasoline to see them 350 miles on their journey, if the going is not too bad. With his radio transmitter in his turret, the commander keeps in touch with airplanes flying ahead out of sight, scanning the billows of sand for the first sight of the Arabs.

As soon as the planes locate the raiders, the commander signals his cars to close up. The Arabs are strung out in crescent shape, as is their habit. A flag signals the commander's orders as the cars advance. Meantime, the airplanes aloft swoop down toward the Arabs, who give volleys of bullets from their modern rifles. Crash! Bombs drop from the cockpits. One horn of the crescent has been crumpled up. Yelling and shouting, the Arabs break the center of their formation. The armored cars are among them. Some of the

Akwam leap off their frightened camels, and hold up their hands, while the others flee.

This is what happens to these Arab irregular "meharistes" who face modern armament, the radio and airplanes. But soon the British Royal Air Force desert patrols will have to meet their own weapons, for it is known that the powerful Arab king of the Hedjaz, called the "Cromwell of the desert," has recently set up, not only an air force and flying schools to teach his fierce subjects military aeronautics, but has ordered the Marconi radio corporation to build a powerful transmitter and radio telegraphs and telephones, right in the heart of the holy city of Mecca, in which, up till recent years, it has been

death for an unbeliever to set his foot. All radio apparatus has to be brought by camel along the old Biblical caravan tracks from the coast ports into the interior.

Down south in the corner of Arabia, is another desert kingdom, ruled by an Arab emir, the Imam Yahya, king of the Moslem sect of the Sayids. He has radio and telegraphs linking all his towns, and has a drilled army of 10,000 men.

## SINGING SANDS OF THE DESERT a-69 ATTRIBUTED TO FRICTION

Scientists for many years have attempted to explain the phenomenon of the noises emanating from apparently quiescent sands in some deserts, and recently a theory has been advanced that the singing sands are due to friction. Sonorous sands are found in Arabia, in particular, where the eerie noises have given rise to many native superstitions. Unlike singing beaches which give forth musical notes only when the sands are



Carl W. A. Kysen  
Minter, Ala

Clips New York Times

Q-566

disturbed, the desert sands break the silence intermittently, even when quiet, by penetrating noises ranging from the twanging of harp strings to the rumble of distant drums. Often the sound resembles that produced by a wet finger drawn about the edge of a water glass. Because of the queer noises produced, South Africa has what are known as laughing sands, while in Chile are the rumbling sands and in the Sahara the moaning sands. America's one example of desert singing is in Nevada where, from a dune four miles square, noises emanate that sound like telegraph wires fanned by a breeze. The rubbing together of millions of sand grains of about the same size now is generally believed to be the cause of the desert voice.

### FLYING LABORATORY ON RAILS FOR STUDY OF HELICOPTER

At the institute of aerotechnics near Paris, there is in operation today the first helicopter laboratory on wheels. The laboratory, with its intricate equipment, is mounted on trucks running on rails. It is a marvel of precision and provides an exact means of studying the laws of vertical flying in relation to propeller turns and stability.



Laboratory on Wheels for Studying Action of Helicopters and Laws of Vertical Flying



Aerial Tramway and Seat for Lineman; He Is Pulled along Auxiliary Wire by Workman on Ground

### AERIAL SUPPORT FOR LINEMAN MAKES REPAIRS EASY

Much of the danger involved in installing new telephone lines or repairing old ones is eliminated by an aerial tramway for linemen in use in Germany. An auxiliary wire, strong enough to support the weight of the repairman, is stretched and the lineman is strapped in a comfortable seat and lifted to the guide wire along which he is pulled by a workman on the ground by means of a rope.

### BREAKFAST GOES UNDER DOOR TO HOTEL GUEST IN BED

Breakfast of coffee and rolls is served through the bottom of the bedroom door to the guests of one New York hotel. The meal comes in a small pasteboard box which is pushed through a small trapdoor in the bottom of the large door. The coffee is in a thermos jug and the food is served without arousing the guest. Cream and jam are in small jars held in two holes in the cardboard container, and butter and rolls are wrapped in wax paper.

Telephone Company in Berlin

Chas. Louis Lamblanc

Barbizon Plaza  
Central Park South



a. 61 1/2



Taxidermists of National Museum Fitting a Fur Coat on a Huge Gorilla Specimen Shot in Belgian Congo

### GORILLA MOUNTED FOR DISPLAY BY SKILLED TAXIDERMISTS

Taxidermists at the National Museum in Washington are among the greatest experts in this line in the United States. In their daily work, they mount animals, birds, fishes and reptiles from all over the world, some of the specimens requiring extremely delicate handling. Recently a large gorilla was added to the display. This animal, shot in the Belgian Congo, was five feet and four inches in height, weighed 400 pounds and had a reach of more than eight feet. The skin was mounted only after a base had been prepared with a miniature gorilla as a model.

### SOLDERED ALUMINUM JOINT IS STRONGER THAN METAL

Making practical the use of aluminum in many new ways, a solder for both aluminum and white metals is now being produced. It is claimed the solder makes a joint stronger than the metal itself, and it can be applied with an ordinary soldering iron or open-flame torch, or by tin-

ning the solder on the heated metal. Its melting point is low and it flows freely while the color is nearly identical with that of aluminum. It is expected the solder will find a wide application in the aviation industry and also in salvaging and repairing aluminum and white-metal die castings, architectural fabrications, automobile bodies and the like.

### WHIRLING GLASS DISK IS CLEAR-VIEW SCREEN FOR BOAT

a. 58 6

Rain, spray and snow are kept off the window of the wheelhouse of a boat by the insertion in the opening of a clear-vision screen which consists of a polished glass disk rotated on a central bearing by an electric motor. The disk by its motion throws off rain and spray or even fog, giving a clear view ahead at all times regardless of the weather. The screen can be obtained in a frame for mounting in a window of any size, or separately for mounting in an existing window in which a hole is cut to receive it. The weight of the screen and motor is supported by a bracket bolted above the window, and the frame is weatherproof.

Copy Merit



32 wall. 20. 10 1/2 115 wall 9 10 1/2

Whirling Glass Disk Mounted in Window of Boat's Wheelhouse to Provide Clear Vision in Storm

a. 6 47

Pittsburgh Metals  
Purifying Corp  
31 S Pittsburgh

Chas. Cory Corp  
68 King  
material

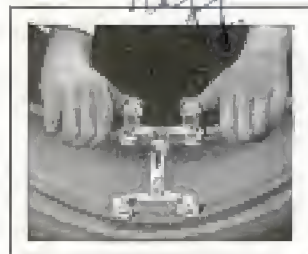


U.S. Dept of Agriculture A. 570  
Release 3/10/81

## PLANES OBTAIN WEATHER DATA ONCE SECURED BY KITES

For nearly thirty years, the weather bureau has used kites to explore the upper air, obtaining much valuable data from the instruments carried aloft in this manner. The wide extension of aviation, however, is likely to cause early abandonment of these kites because they are considered a hazard to flying. In some cases, the kites are sent aloft by several miles of powerful but invisible wire. If an airplane came in contact with such wires, serious damage might result. Instead of kites, the government now is planning to secure observations in the free air by means of daily airplane flights, and has already invited bids for such a service in several localities. It is anticipated that the cost will not be any greater than the kite flying, and the planes can go aloft on many days when kites cannot be sent up. Kite stations cost from \$10,000 to \$12,000 a year to maintain.

## TIRE SPREADER IS ADJUSTABLE TO MAKE REPAIRS EASY



Serving as an extra pair of hands in making tire repairs, an adjustable spreader is so small and light that it can easily be carried in the tool kit. It consists of an adjustable frame of cast aluminum with steel wheels in the T-shaped ends. The tool is inserted in the tire and rolls on the bead with only a push of the hand, thus keeping the casing spread apart, and leaving both hands free to work.

## DEPTH APPLIED TO DRAWINGS BY PERSPECTIVE INDICATOR

To save much time for draftsmen and architects in preparing three-dimension drawings, a perspective indicator for this purpose now is being offered. It consists of six working charts in three sizes and a demonstration chart giving instructions. The charts are prepared with a system of lines drawn to scale and so ar-

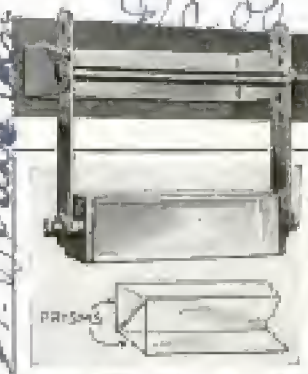


Example of Perspective-Indicator Chart, by Use of Which Depth Is Added to Line Drawings

anged as to serve as guides for any desired perspective. The indicator is placed on the drawing board under a sheet of tracing paper. It then becomes a simple matter to lay out any type of drawing in perspective at any distance from the eye or at any elevation and scaled to any desired proportions. It may be used also for architectural picturization, study of proportions, scaling detail, furniture and mechanical designing, and for interior detail. Airplane or bird's-eye views are obtained by turning the chart upside down.

## GLARE STOPPED BY PRISMS TO AID AUTOISTS

Headlight glare from the lamps of approaching cars is averted from the motorist's eyes by an automatic optical shield consisting of two accurately and finely ground glass prisms, set, with a minute air space between, in a metal mounting attached inside the car in front of the windshield. The driver has clear vision through the prisms but when a car with bright lights approaches, the dazzling rays are refracted, the apparatus acting like a curtain to shut out the glare although the visibility is not at all impaired.

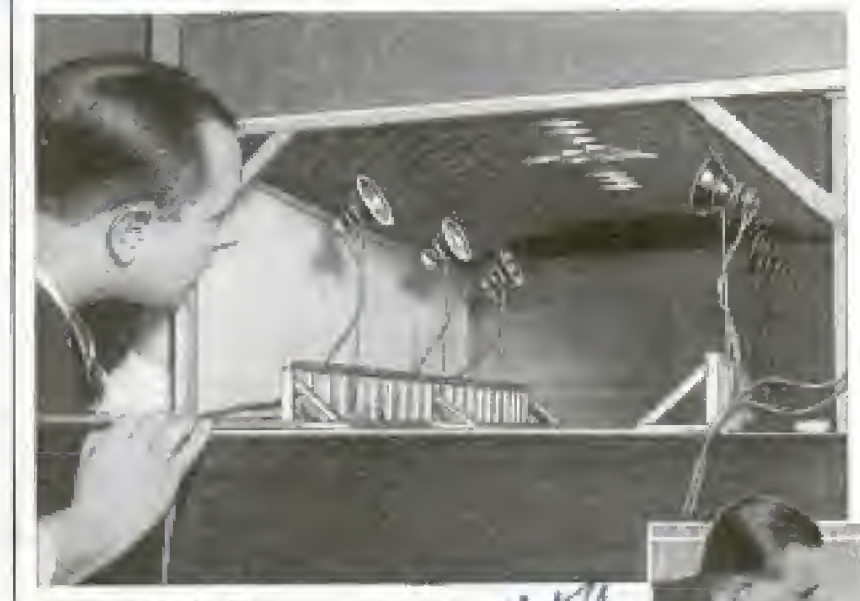


10.00 postpaid  
Cassell.  
Perspective Indicator Co. Inc.  
169 N. La Brea Ave.  
Los Angeles, Calif.

U.S. MacPherson

3510 Perkins Ave.  
Cleveland, Ohio





Studying Interior and Exterior Lighting Effects on Two Models for World's Fair Buildings

### WORLD'S FAIR TO BE A BLAZE OF LIGHT AND COLOR

Since light is expected to play an important part in the scenic effects for the 1933 World's Fair at Chicago, an experimental laboratory has been established to conduct tests with both interior and exterior lighting schemes. Tentative illuminating plans are tried out on model buildings, floodlights in various colors and various forms of motion being tested until the most striking and pleasing effects are found. Plans call for both interior and exterior illumination of virtually every building on the fair grounds to make the structures a blaze of light and color at night.

### SOUND THAT KILLS BACTERIA FOUND BY SCIENTISTS

Audible sound waves, so high-pitched and intense as to be best described as a "terrific squeak," have been used to kill bacteria by two Texas scientists. High-pitch sound waves, inaudible to the human ear, have in the past been used with fatal effects on living things, but the Texas experiments are the first in which audible sounds are shown to be effective. The nerve-racking squeak was produced with a nickel tube which was caused to vibrate at about 8,800 oscillations a second by means of powerful electromagnetic coils wound about its lower end. The oscil-

lating current was supplied through two 250-watt radio tubes. The upper end of the tube was set in an inverted bottle and surrounded with water. When the current was turned on, the vibration was so intense as to cause a mound of



water to rise above the surface. A flask, containing the bacteria, was lowered into this turbulent water mound, the sound waves passing through the glass into the fluid and causing a similar disturbance. Bacterial cultures exposed from ten to sixty minutes were compared for numbers of survivors, and it was found a definite relation existed between the time of exposure and the number of live germs left. After an hour less than half the initial number were still alive.

### TAIL "LIGHTS" PROTECT DOGS FROM CARS AT NIGHT

Dogs now are being equipped with red lights as a protection from automobiles. Dog collars are provided with brilliant mirrored glass facets which pick up and reflect the lights of the car, the reflectors usually attracting the attention of the night driver.

*Science Service 520 74*  
*Q-625*  
*3/14/31*  
*Prof. O. B. Williams, Austin, Texas*  
*Prof. Newton Leavies, Texas Christian Univ.*  
*Loggins to Halliford*  
*Shepherdton*



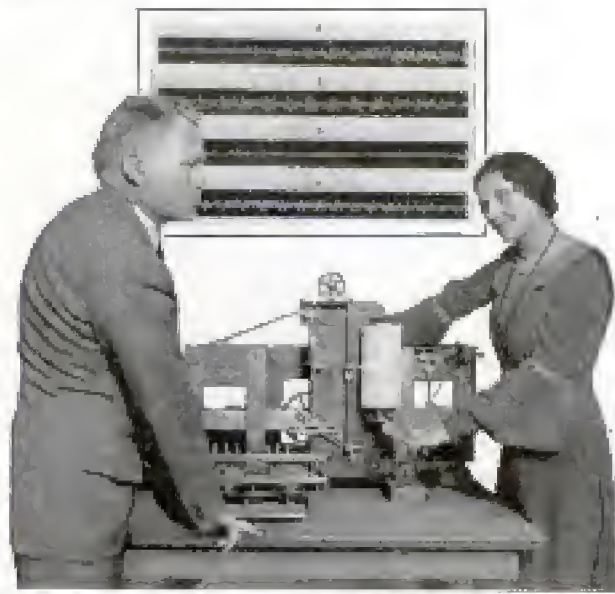
College of Agriculture  
 University of California  
 Davis, California  
 Cont. Frank M. Chase J.W. Barnett,  
 901 W. Daniel  
 Champagne, Ill.  
 POPULAR MECHANICS  
 A-630  
 923  
 engineer

## SOYBEANS USED IN ICE CREAM INSTEAD OF BUTTERFAT

Soybeans have been used successfully  
 as an ingredient for a frozen dessert re-  
 sembling ice cream, soybean oil replacing  
 butterfat in the product. This is not the  
 only frozen delicacy in which soybeans  
 can be employed, as a sherbet has been  
 made in which soybean flour is an impor-  
 tant part. Another soybean product has  
 been used commercially as a substitute  
 for egg yolk in making some kinds of ice  
 cream. At a recent luncheon of the  
 American Soybean association, besides  
 the frozen foods there was also served  
 a soybean health drink.

## SYNTHETIC VOICE IS CREATED FROM "PIECES OF SOUND"

Voices that never existed can be created  
 in the laboratory by piecing together  
 "fragments of sound." University of Cali-  
 fornia scientists who have been creating  
 these synthetic voices use records of  
 sound vibrations of various letters. They  
 measure the length of the sound vibra-  
 tions of each letter and adjust a machine,  
 called a "synthesizer," to correspond to  
 these measurements. It then produces an  
 enlarged "picture" of each sound, these  
 sound pictures being pasted together in  
 any combination to form words for re-  
 production with motion-picture talkie ap-  
 paratus.



Apparatus Which Pieces Together Sounds of Letters  
to Make Synthetic Words and an Example

Cont. V. L. Chackwell  
 354 Spring St  
 Los Angeles, Calif.



Robot Man with a Mechanical Brain Who Responds  
to Orders Spoken into Telephone Mouthpiece

## ROBOT OBEYS SPOKEN ORDERS AND HAS MECHANICAL MIND

Capable of responding to spoken com-  
 mands, a robot man with a mechanical  
 brain has been developed by the Westing-  
house Electric and Manufacturing com-  
pany. This mechanical man, named "Mr.  
 Vocalite," is able to stand, seat himself,  
 talk, sing, turn on fans, electric ranges or  
 light and smoke cigarets at the spoken  
 request of his human master. Robots  
 of the past have responded to whistled  
 signals, but Mr. Vocalite is the first man-  
 like figure to translate vocal orders into  
 action. The voiced instructions are trans-  
 mitted through an ordinary telephone  
 mouthpiece, but there are no electrical  
 connections between this transmitter and  
 the mechanical brain of the robot. The  
 electrical impulses caused by the spoken  
 words are carried by a beam of light to  
 a photo-electric cell which relays them  
 to the robot's "thinking" apparatus. This  
 combination of voice and light includes  
 principles already in use in industry and  
 those still in the laboratory stage. Some  
 of these devices protect banks against  
 robbery, turn on electric light, and sort  
 yeast cakes and other products.



a. 530

Civil. John L. County  
714 Jefferson St

Washington D C

# Long Distance Weather

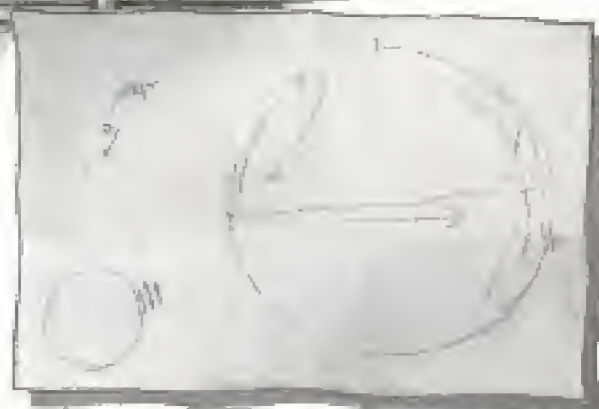


The evidence from which Doctor Abbot draws his conclusion consists in comparisons of daily measurements, over a period of years, of the sun's radiation, made by the Smithsonian's observatory at Calama, Chile, with the plotted mean temperature and barometric pressure throughout the United States over the same period of years, as supplied by the weather bureau.

**I**S a study of the sun destined to revolutionize weather forecasting? Dr. Charles G. Abbot, of the Smithsonian Institution, Washington, D. C., internationally known scientist, is of the opinion that such is the case. Long-range weather forecasting, the butt, hitherto, of many a joke, is "just around the corner," he believes. Doctor Abbot says:

"Meteorologists have hitherto believed that weather (which is defined as the departures from regularity in climate) depends principally on the irregularities of the earth's surface, and, like rough water in a stream over a rocky bed, is essentially unpredictable for any considerable time in advance, but evidence tends to show, on the contrary, that weather changes are brought about chiefly by variations in the sun's radiation.

"These changes in solar radiation are periodic and promise to become predictable long in advance; weather appears to respond directly to them, although there are modifications due to local conditions. The conclusion is that long-range forecasting is possible and even probable."



Doctor St. John Explaining to Prof. Einstein How Spectroscope on Mt. Wilson Is Used in Photographing Sun; Below, Rough Sketch by Prof. Einstein in Working Out His Ideas on Solar-Radiation Theory

In every instance, Doctor Abbot reveals, "the curves of temperature and barometric pressure, corresponding, respectively, to rising and to falling solar radiation, showed a marked opposition to each other." When the sun's radiation increased, as shown by the Chilean station data, the temperature and barometric pressure at Washington decreased, and vice versa. A similar opposition was also marked at Williston, N. D., and at Yuma, Arizona.

Doctor Abbot further has discovered an apparent relation between average mean temperature changes and solar





Smithsonian Solar-Radiation Observatory at Calama, Chile; the Man Is Using the Theodolite, an Instrument with Telescope Attachment for Measuring Horizontal and Vertical Angles

changes, five degrees Fahrenheit, corresponding to solar changes averaging eight-tenths of one per cent; which leads him to conclude that temperature effects caused by solar changes may, on many occasions, amount to as much as ten, fifteen or twenty degrees. "That is to say" declares Doctor Abbot, "major changes in weather are due to short periodic changes in the sun."

However, asserts Doctor Abbot, before long-range weather forecasting is possible, scientists must first be able to predict radiation changes in the sun. In other words, if variations in the sun's radiation produce weather changes and if these variations can be predicted, then the weather for weeks and even months ahead can be forecast with measurable accuracy.

Doctor Abbot believes that these variations are predictable. In fact, in support of this belief, he has gone so far as to predict what the solar radiation will be for

this year and 1932. These predictions are based on data gathered over a period of years and from three widely separated spots on the earth, namely, Bukkaros, southwest Africa, and the observatories at Calama, Chile, and on Table mountain, California.

Doctor Abbot's suggestion is that the variations in the sun's radiation affect the circulation of the atmosphere. The atmosphere absorbs from one-tenth to one-fourth of the sun's radiation coming to the earth. This causes wind direction to change at different places, which, in turn, has a direct relation to the temperature.

Until recently scientists have assumed that the surface of the sun is at a uniform temperature throughout. But now Professor Einstein has advanced a new theory which upsets that assumption; briefly, that the solar body is cooler at its equator than at its poles.

This theory was inspired by a lecture





Tower Telescope at Mt. Wilson Observatory for Studying the Solar Surface

on solar atmospheric currents by Dr. Charles E. St. John, of Mt. Wilson observatory, California. Later Professor Einstein announced that he believed the movement of atmosphere over the solar surface to be due to a difference of temperature between poles and equator, and the inequality of temperature is accounted for by more active radiation along the equator than at the poles. This would result in leaving the solar surface cooler at the equator.

But what is the cause lying back of this unequal radiation? Professor Einstein believes it to be a flattening at the poles. It is an established law that any body whose dimensions are greater one way than another, when heated to a temperature above the surrounding medium, gives off heat at the ends faster than at the sides.

The solar atmosphere is approximately 130 times the observed depth of the earth's atmosphere, or some 9,000 miles as against about seventy. Differences in temperature, also, are tremendous, the terrestrial average being around sixty to seventy degrees Fahrenheit and the solar 7,000 degrees.

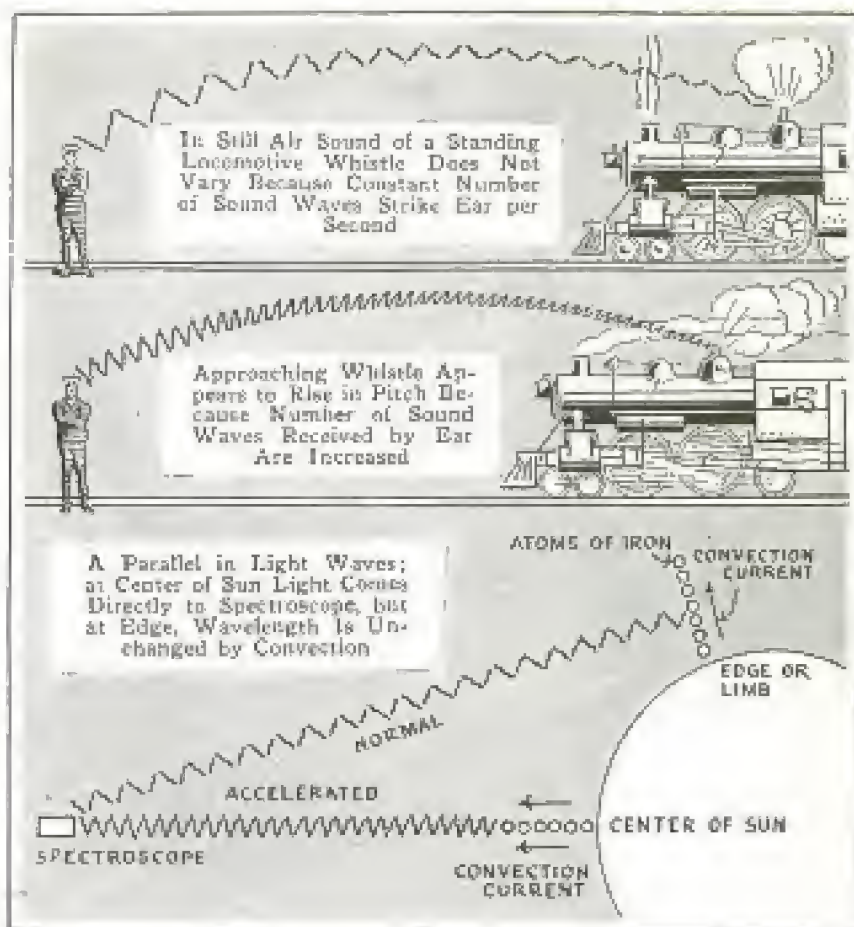
Singularly, in spite of the 93,000,000 miles of intervening space, scientists have learned more about the upper layers of the solar atmosphere than of the terrestrial, because the former is observed, through the spectroscope, from the top down to the sun's surface, whereas literally there is no way to "get at" the upper layers of the earth's atmosphere except with instrument-carrying balloons and, at lower altitudes, airplanes.

The spectrum, of course, is an image formed by rays of light arranged according to their wavelength. White light contains all the colors and, when split up through a prism, displays a band forming the seven colors of the rainbow, from violet at one end to red at the other. Every chemical element, when glowing and observed through the spectroscope, displays a spectrum of definitely spaced bright lines, no two of which are alike. The light wave for each line is of constant length, except when the source is approaching or receding in the line of vision. If approaching, the bright lines shift toward the violet; receding, toward the red.



The whistle of an approaching locomotive furnishes a simple illustration of this principle. Its pitch rises, and the explanation lies in the fact that the number of waves per second received by the ear is increased by the speed of the oncoming locomotive. But when the locomotive is standing still the sound waves strike the ear with uniform frequency, that is, the wavelength does not change. A receding whistle produces the reverse effect; the pitch goes down. The same principle holds true with light waves, in which the spectroscope replaces the human ear.

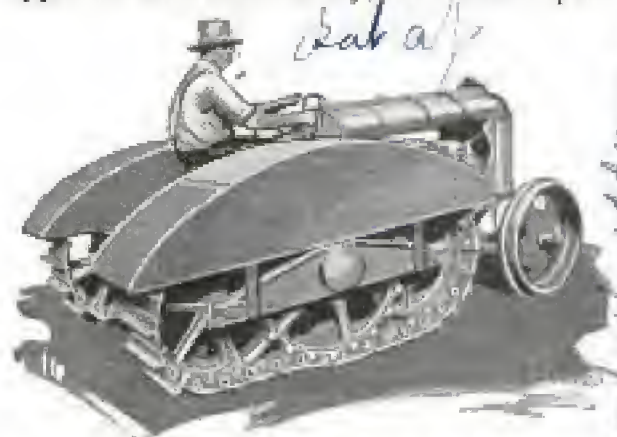
Thus it is possible to observe movements of the vaporized elements which compose the solar atmosphere. Photography of solar spectra from the 150-foot tower telescope on Mt. Wilson is done through a tiny slit one-eighth of an inch long and only three-thousandths



of an inch wide, yet it covers an area on the sun as large as the United States! And that is on an image eighteen inches in diameter, the largest possible with any telescope in the world.

## TRACTOR TREAD WITH CLEATS PREVENTS SLIPPING

Endless-tread tracks, fitted with cleats, are being offered to replace the wheels of Fordson tractors and certain other types of farm machinery, in order to pre-



Tractor Tread with Cleats Which Can Be Used Instead of Rear Wheels on Fordson Tractors

vent slipping and increase drawbar pull. The cleated tracks can be installed without changes or alterations to the tractor, and the shoes are interchangeable. Each unit operates individually, allowing the machine to pass over very rough ground or obstructions. Both top and bottom of the double sprockets are in mesh with the track, no less than twelve teeth on each side being engaged at any one time, and the idler wheels are adjustable.

## FRUIT CONVERTED TO POWDER

All kinds of fresh fruit can be converted to powder form without the use of chemicals, heat or cold by a process developed by a German engineer. The product retains the color and flavor of the original fruit indefinitely and the method, intended to prevent waste, requires only a few minutes.

Illustrated by J. H. ...  
 9/12/31  
 Peerless Tractor Co.  
 St. Joseph, Mich.  
 Carl Hassel  
 Berlin

Peerless Tractor Co.  
St. Joseph, Mich.

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Designed by Frank & Beer,  
 2707 Waverly Drive, Los Angeles  
 928  
 A-70 Popular Mechanics  
 Cable



Collapsible Rowboat Made of Aluminum Alloy That Weighs Only Thirty Pounds; It Will Carry More Than Thirteen Times Its Weight

## FOLDING ALUMINUM ROWBOAT WEIGHS THIRTY POUNDS

Weighing only thirty pounds, a collapsible rowboat made of aluminum alloy is so light and compact that it can easily be carried from one body of water to another by one man. The craft is ten feet long, three feet wide and can carry about 400 pounds.

## LENGTH OF GOLF DRIVE SHOWN BY COIN-IN-SLOT MACHINE

Golfers now can make a 300-yard drive on an indoor course, and be in no doubt as to the distance the ball would have traveled down the fairway. A coin-in-the-slot driving machine registers the length of each drive on a meter actuated

by the velocity and height at which the ball is traveling. The ball is driven into an opening surrounded by netting, and, if the pellet is hit correctly, it strikes



a mechanism at the rear of the range which is concealed by the picture of a fairway. The length of the drive is indicated on the meter which then drops back to zero. A coin-in-the-slot device delivers nine balls to the player when he pays his fee, or for home use, the range may be obtained without this feature.

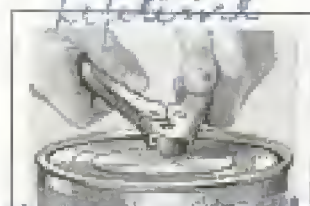
## BEDS BUILT OF STONE

Evidence that people of the Stone Age actually slept in stone beds has been obtained in excavations in the Orkney islands, off Scotland. In some of the stone huts were found bed-sitting rooms, the beds, standing against the wall of

the hut, being oblong boxlike inclosures with stone slabs for sides, held in place by stone wedges driven into the floor. The slabs at the head and foot are taller, like bed posts, and perhaps were designed to support a canopy of skins.

## CAN OPENER WITH JAW GRIP IS EASY TO OPERATE

Resembling a nutcracker, a can opener with gripping jaws is extremely easy to operate, since the opener itself grips the can and both hands can be applied to the task. One handle contains the steel cutter and a guide pin which fits on the outside edge of the can, keeping the cutter in proper position and preventing the user from cutting himself. The second handle contains the gripping jaws that are placed to straddle the edge of the can. The pressure on the handle with the jaws turns the can toward the cutter. The opener fits square and round cans and also will serve as a can lifter.



Robell Mfg Co clue  
 250 W. 54th. New York

Johnston Household  
 Utilities Dept  
 1441 Merchandise Mart Bldg



A. 593

Francis E. Ingalls

# VOLUNTEER RUNS ONE-MAN FIRE TRUCK AS HOBBY



One-Man Fire Department, and the Truck Owned and Operated by a Connecticut Fire Fan

Going to fires held so much fascination for a Guilford, Conn., man that he has purchased and equipped his own one-man volunteer fire department so he can answer all alarms and also be of assistance in fighting blazes. He has a fire truck which carries 1,250 feet of hose, a deck gun, four searchlights, and a powerful engine-driven pump.



## POWER FED TO BIG RADIO TUBE WOULD RUN STREET CARS

Enough electricity to push two street cars up a steep grade can be fed to a giant radio broadcasting tube recently completed for station KDKA, at Pittsburgh. The light is produced by the action of electricity sent through mercury

vapor, a current of thirty amperes at 7,500 volts passing through three anode arms to vaporize part of the mercury and create a brilliant glow. This tube has great power and is being used to "kick out" radio programs to all parts of the world from the station.



Giant Radio Broadcasting Tube, Which Consumes Enough Electricity to Operate Two Street Cars

Research Laboratories  
Westinghouse Electric  
Mfg. Co. & Pittsburgh Pa

## TRUCK MIRROR IN RUBBER CASE WITHSTANDS KNOCKS

Rear-view extension mirrors for trucks are easily broken because they often project so far they strike obstacles. To protect the glass, a rubber container for the mirror is offered. This frame on an extension arm usually withstands a heavy blow without injury to the glass, but if the mirror should be broken, it is a matter of only a few seconds to insert a new glass in the resilient case.

Crown Products Co  
Columbia Material  
N.Y.C.

Indianapolis  
Columbia  
Horton Co. 801 Alexander Bldg.

A. 457

Complete  
\$2.00



Conk Willis H. D'Arminio  
Western Air Express  
Salt Lake City, Utah



Sagging Railroad Bridge in Sicily Which Collapsed with a Train on It during a Cyclone; No One Was Killed or Even Injured

## TRAIN AND BRIDGE BOTH FALL WHEN CYCLONE STRIKES

When a cyclone hit Sicily recently a railroad train and a steel bridge over which it was passing both fell near Palermo, the bridge sagging and carrying the train with it. The wrecked train was left standing on the collapsed bridge and not a person was even injured.

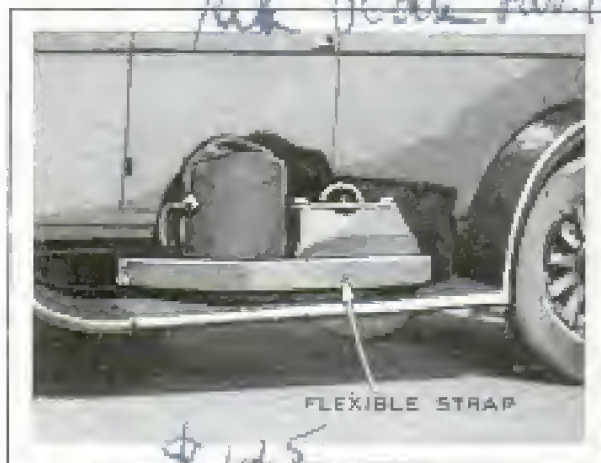
## AUTO HEADLIGHTS SAVE PILOT LOST IN A DENSE FOG

Lost in a dense fog near the Salt Lake City airport recently, an airmail pilot was saved from possible disaster in making a forced landing through a combination of the radio and the automobile. The pilot ran into the fog as he neared the city and soon found himself flying blind and almost out of fuel. He located a farm house by its lights, and circled it for nearly an hour, when ice began to form

on the wings, making it impossible for him to climb and hence imperative that he level out for the field. He called the Salt Lake radio station by radiophone explaining his plight, and after a consultation with mechanics, the radio operator told the pilot to watch for automobile headlights. Two cars were sent out, one being parked near the farm house with its lights pointing toward the field, and the second between the first auto and the field, its light also pointing the way, thus making a straight path for the pilot to follow until he found the airport searchlight looming ahead.

## FLEXIBLE LUGGAGE RACK FOR AUTO'S RUNNING BOARD

Adapting itself to packages of uneven shape, a flexible luggage rack for the running board of the automobile snaps tightly against the apron of the car when not in use, and serves as a protection to this part of the body. It consists of a rubber band which is easily attached and holds luggage securely in place, even if it extends beyond the running board.

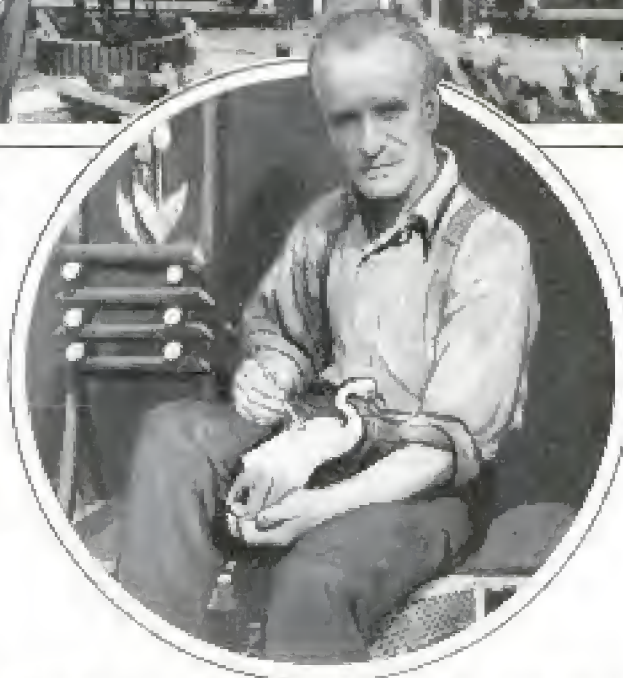
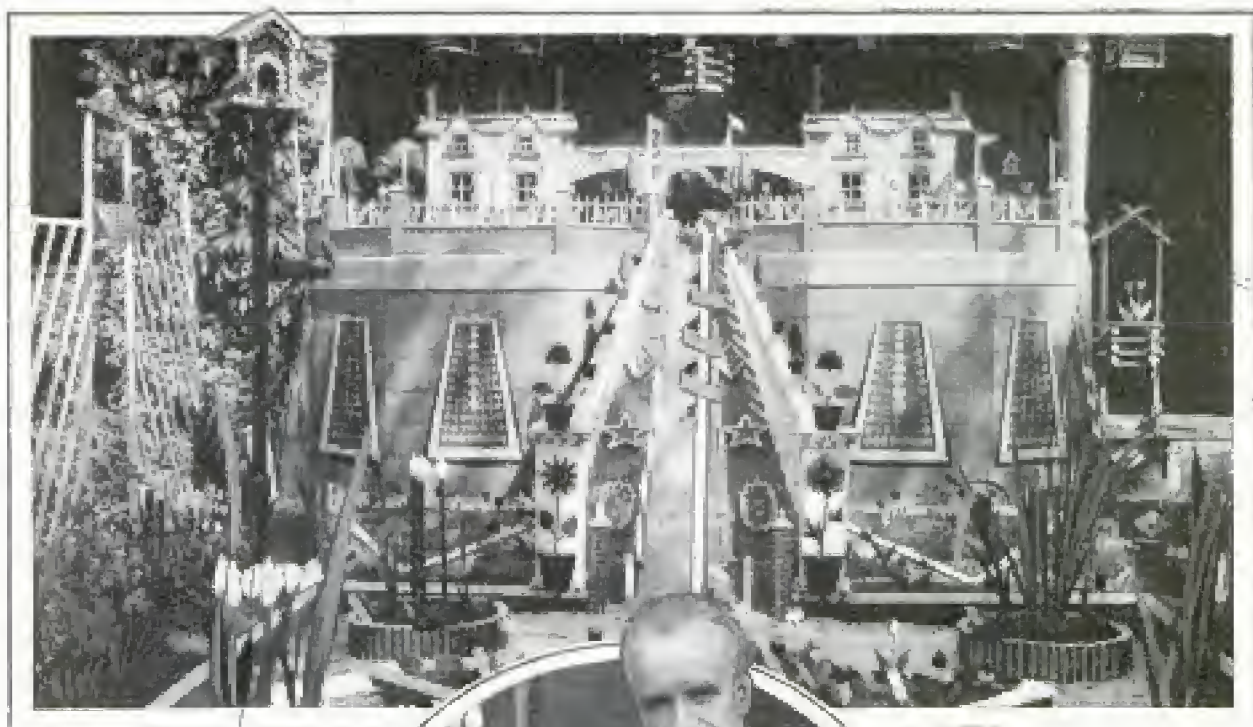


Flexible Luggage Rack for Auto Running Board Grips and Holds Bags Securely

The Wedler-Myford Co.  
1116 S. Grand  
Salt Lake City, Utah



## GARDEN OF WOODEN FLOWERS RIVALS NATURE



Wooden Flower Garden with Painted Blossoms beside a Miniature House, and Man Who Made It

Using only a jackknife, saw and paintbrush, a Winnipeg craftsman has made a wooden flower garden in a thirteen-foot plot of ground, working at the task for two years in his spare time. He has not only gilded the lily, but has painted every other blossom as well. Flowers, vegetables, fruits, birds and miniature houses are arranged in the plot, all made of wood and painted in natural colors. The flowerbeds contain pansies, geraniums, poppies, tulips and primroses, all braving the rigors of winter without fear of frost. Bright-hued wooden butterflies are found about the garden, and there is even a wooden caterpillar. Paths and driveways lead to two miniature houses. There are wooden birds in colors, one with a wooden worm, and these miniatures and a bird bath attract many real birds. Hundreds of pieces of wood were carved, painted and fitted to make the garden. One flower has thirty-eight parts

and more than 400 holes were bored for the posts surrounding one small bed. No nails are used, the pieces all fitting together so that all can be taken apart. The wooden garden was started after real blossoms in the plot had been picked by passers-by or destroyed by dogs. On the veranda of one of the miniature houses

the owner has constructed a roof garden and he is now adding an aquarium with wooden goldfish and wooden water lilies. Herons stand at either end of the pond, one with a carved goldfish in its mouth. The garden is an allegory, some parts representing events in the builder's life, while some flowers are named for persons he has known.

□We want all our readers to write us freely and often whenever they wish additional information on articles published in this magazine. Address Bureau of Information, Popular Mechanics, Chicago.

Cont. Mrs. J. H. Fopple  
595 O'Leary St. Winnipeg  
Manitoba, Canada



A. 482 Cont. Andrew A. Boone,  
613 Spruehls Theatre Bldg.  
San Diego, Calif.

# The Tricks of



Left, a Group of Snarling Tigers in a Circus Act; Below, Woman Trainer Wrestling with a Large Bengal Tiger, One of the Most Dangerous Feats Attempted with These Big Cats

By RALPH ANDREWS

**R**OUND and round, his front paws tapping lightly an endless black stripe, a Bengal tiger turns on a circular table. His body swings in as he "banks" for the continuous turn.

On the other side of the iron-barred cage, a second jungle cat, nicely balanced, walks a large wooden ball across the arena. In the background thirteen jungle-bred animals sit on their wooden pedestals, calmly surveying their trainer and the applauding audience.

Some of the circus tigers you will see this year never have appeared before. They are fresh from the jungles of India, Sumatra or Java. Importers brought them from native haunts last year, sold them to the circuses early in the winter, and, during four months of intensive training, they have been accustomed to the hard facts of rigorous circus life.

"We study these animals as a teacher or mother studies a child," a woman trainer explained. "Some are timid, some brave, others are murderous, a few will be diplomatic and, occasionally, one will clown through an act. Some of the veterans have been with the act ten years or longer. Each year we change the routine to accommodate new tigers to the show.



Teaching old cats new tricks is the hardest job of winter quarters. They become saucy, like a petulant child. Recently I worked all day trying to get one to come to my left side and lie down. Her cue is, 'Come here, Kitty!' She comes, but after a season of entering on the right, only long coaxing will change her routine.

"In introducing new tigers to the act, I lead them into the arena singly, but with one or two of the old-timers on their pedestals. We never take a circus-trained tiger. I prefer them fresh from the jungles, young and with no tricks to beat out of their systems. A new cat hesitates to



# Training Jungle Cats

walk down the chute from his cage to the arena. I follow him outside, tapping his hind quarters lightly with a stick. Once he is inside the arena, I enter, advancing behind a pedestal for safety in case he attacks. I speak gently but firmly to the animal, approach him slowly, try by speaking and cracking the whip to make him retreat. Once a tiger retreats, half the work is done.



Their presence reassured him. Then I placed him on a pedestal near the ball. He watched it closely a half day. After several hours he reached out a paw and touched it. A little later, he got down and smelled it. Then I returned him to his post to let him know he had done something correctly.

"After another day of smelling, I led him to the ball and helped him climb up until all four feet were on it. Had he fallen at this time, the tumble would have

Top, a Tiger Ready to Push the Trainer to the Mat in a Make-Believe Fight; Below, Playful Tiger Gripping Trainer's Leg; One False Move Now Would Spell Disaster for the Trainer

He does not yet know enough to mind when I speak, and if he fights back, with me or the other cats, we send him to his cage, wait a day or two and begin anew.

"Even after the cats have become accustomed to working together, if I bring in an extra pedestal or a ball, the whole group is upset. In teaching one to walk a wooden ball this winter, I put two older tigers on their pedestals in the back of the arena, about thirty feet from the ball.

destroyed his confidence. But we guard against such things. The ball, wrapped with rope into which he dug his claws, was held firmly with block and ropes. Two men outside the arena, tugging on ropes turning through blocks fixed to stakes, pulled the ball slowly backward and forward until the cat became confident he could operate the thing alone. I touched his feet softly with the whip handle and set his feet back after the ball





Above, Tiger and Trainer at Ease; Right, a Jungle Cat Attacking His Trainer

had been pulled forward two or three inches. In a week I could say 'come here,' and the big cat would walk the hall across the arena.

"'Sonny Boy' probably gets a greater 'kick' from his work than any of the tigers. He runs on the revolving table. At the beginning of his training, I placed him on the table, holding a short rope to keep his head pointed in the right direction. A helper, on the other side, turned the table by hand. The tiger would set one foot forward warily, then bring up another. At first he had a tendency to run straight ahead instead of in a circle, and would run off the table. But I pushed his head inward, and leaned against his body. Suddenly he got the knack of turning corners and in a day learned to follow a black painted stripe with his eyes.

"They seem docile when they're in 'Sonny Boy's' usual mood. But don't let them fool you. I broke one tiger twelve years ago and thought he was one of my standbys. In winter quarters recently, without warning, he flew through the air and struck me full in the face. As I went down, his claws tore the flesh from one hand. Quick as lightning he pounced on me. Only the sharp lashes of a helper's whip drove him off."

While these acts appeal to the public,

tiger wrestling offers the trainer her greatest thrill and real danger. People who know animals know this to be the most dangerous act any circus performer can attempt. A misstep, any sudden excitement, and the big Bengal may tear into his partner and leave only a lifeless form



to be dragged from the cage by helpers.

The trainer, Miss Mabel Starke, first wrestled a tiger fourteen years ago and since that time has come in close contact many times with their sharp claws and menacing teeth. She has broken both males and females, but of the seventy-four tigers she has trained, she has had only two jungle cats in whose embrace she would trust her life. The first of these was a male, but her present wrestling mate is a 350-pound, ten-year-old female cat. But how did she teach this jungle-bred animal to rear on her hindlegs, embrace her in her forelegs and push her to the mat?

These jungle cats, capable actors, are quick to learn. They are among the smartest of the animal kingdom—and the most treacherous. When a trainer at the conclusion of an act asks, "What do you say, cats?" and they answer with a symphony of "woof-woof," the audience thinks they are ready to tear the trainer limb from limb. Not that; they're only anxious to



get back to the menagerie tent for the late afternoon meal. There they emit roars louder than anything ever to come from a jungle. This aids their digestion and helps clear the tent—for there's another show tonight.

## CELLAR MADE INTO BATTLESHIP TO TRAIN RESERVE UNITS

Naval reserves of one Connecticut unit gain knowledge of the art of war at sea from the deck of a battleship built in a basement. The cellar floor of the state armory at New Haven has been transformed into a dummy torpedo-boat destroyer, the concrete floor representing the deck. The parts of the superstructure are carried out to one-third scale where space permits, and there are even such fine details as boat davits and toy lifeboats that one man can lift "over the side," that is, over the line which marks the edge of the make-believe deck. The four smokestacks are made of thin sheet iron, painted gray, and there are the usual side lights, red and green, signal lights, blinker system, voice tubes, siren, bridge, wheel, anchor, deck lines, deck fire plugs and hose. There are even engine-room hatches, represented by wooden frames with lights beneath them. On the walls of the basement are painted engine-room boilers, valves and other equipment, and on another floor of the drill quarters a small room has been decorated as an officers' wardroom on a destroyer. Even the port-holes are there.



Basement Which Has Been Transformed into the Deck of a Destroyer to Train Naval Reserves

Lieut. John L. English  
U.S. N.A.



Ladder Containing a Platform and a Tool Rack in the Top, to Save Steps for the Workman

## TOOL RACK ON LADDER SAVES TIME OF WORKER

Jobs that must be performed on step-ladders in places not easily accessible are made simpler with a ladder having a platform near the top which is large enough to hold two men and allows the worker to reach out and use both hands at his task without fear of losing his balance. The top of the ladder is slotted and provides a handy rack for tools, while the back is fitted with rungs and can be used by an assistant, or stages can be placed on them to form a trestle, leaving the steps free for mounting.

## WHISTLING TONES FROM EARTH HEARD ON OCEAN CABLES

Engineers working in Newfoundland on the laying of a submarine telephone cable have reported evidence of the mysterious sounds coming from unknown sources which have been referred to by scientists as "whistling tones from the earth." They heard these sounds both on a test cable and on a loop aerial by day and night, and also picked up other sounds at night only. One theory is that they are due to multiple reflections of static discharges between the earth and the Heavyside layer far above it.

The Radiant

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The Patent Scaffolding Co. Chicago  
1550 Weymouth St.



Rochester  
ny

Horse and Rider at Fort Myer Jumping through a Human "Hoop," Seven Soldiers Forming the Circle of Life for the Daring Stunt

## HORSE HURDLES HUMAN "HOOP" TO SHOW ITS SKILL

One of the daring riders of Fort Myer, Va., jumped his skillful mount through a human "hoop" during a recent society circus there. The circle of life through which horse and rider passed was formed by seven men, four of them supporting two others on their shoulders and holding a third suspended between them.

## VISIBLE UNIVERSE IS DOUBLED WITH NEW LENS

A 744 Thanks to a recent development, the size of the visible universe has been doubled. Shortly, in the opinion of authorities, it will be at least tripled. In effect, the number of high-power telescopes in the world can be multiplied by two at a trifling cost. These are only

some of the results of a new high-speed lens devised by W. B. Rayton, head of the Bausch and Lomb Optical company. This lens has a speed of  $f/0.59$  and was shipped to the California Institute of Technology. Originally it was intended for future use on their 200-inch telescope, now under construction. But the Mount Wilson Observatory astronomers wanted to try it on their present 100-inch telescope. They did. At once this new lens, weighing less than two pounds, and small enough to be carried in an overcoat pocket, transformed the 100-inch telescope into a 200-inch instrument for all practical purposes. Research which astronomers had believed would have to await completion of the giant 200-inch telescope is already under way. In other words, the world has never had a 200-inch telescope, the

100-inch size being the largest yet made. Scientists are still racking their brains to produce the 200-inch instrument, and astronomers were awaiting its completion with hungry impatience to learn what marvels it would reveal. Then here came along a few bits of processed glass and, before the 200-inch monster has been finished, they converted the 100-inch telescope into 200-inch effectiveness. Therefore, with the Rayton lens, the power of all large telescopes may be doubled at a cost of a few hundreds of dollars as against millions for larger telescopes, and that isn't all. Not only does this lens, in effect, double the power of existing telescopes. It also doubles their effective number, by enabling them to do their work in half the time. Thus, to cite one instance, a certain photographic exposure through the 100-inch Mount Wilson telescope with previous lenses would have



*Kollmorgen Optical Corp*

POPULAR MECHANICS 76 7 Way <sup>at the Ave</sup>  
*Q-692 Brooklyn ny*

required more than 100 hours; the Ray-ton lens did it in forty-five hours. What all this means may be seen from the fact that there are in the Milky Way alone about thirty thousand million stars, many of which are suns, a million times as big as our sun. The 100-inch telescope has revealed about two million nebulae, or star clusters, each as large as our Milky Way. The 200-inch telescope is expected to reveal sixteen million new clusters. Some of these are so far away that a radio message that goes around the earth seven times in one second would take 280 mil-lion years to reach a single star and return.



Electric Light Attached to Periscope Tube for Ex-  
 amining Interior of Tanks and Barrels

**LIGHT FOR INTERIOR OF TANKS  
 MAKES INSPECTION EASY**

Examining the interiors of drums, bar-  
 rels or other containers where visual in-  
 spection is usually impossible, is made  
 easy with an electric light designed par-  
 ticularly for this purpose. The instru-  
 ment is simply a small periscope equipped  
 with a powerful light operating from any  
 110-volt circuit. It is small enough to go  
 through an ordinary bung-hole.

**CAMELS NO LARGER THAN DOGS  
 ONCE ROAMED NEBRASKA** *Q-746*

Excavations over a two-year period  
 near Agate, Nebr., have revealed skele-  
 tons recently tabulated definitely by Har-  
 vard University scientists as those of the  
 stenomylus, an animal that roamed that  
 part of the country in the Neocene period.  
 The animal was a dainty creature about  
 the size of a St. Bernard dog, like a camel  
 in shape but with gazelle-like lines, and  
 must have been both graceful and fleet  
 of foot.

*Carl David Morrison*  
 125 Wellington Road  
 Allaper, Pa.

**SMALL ENGINE FOR SWITCHING  
 RUN BY GASOLINE MOTOR**

Powered by gasoline engines like those  
 used on road vehicles, small switching  
 engines that are so short-coupled as to  
 appear like handcars are being tried by  
 German railroads. Each end of the shunt-  
 ing engine is equipped with a device which  
 can lift a portion of the load that is be-  
 ing transferred, thus giving the light-  
 weight engine enough frictional resistance  
 to operate the driving wheels, and more  
 than doubling the tractive force for heavy  
 loads. Under ordinary conditions a simple  
 coupling device is used. It is a one-man  
 engine, both the coupling and lifting  
 mechanism being operated from the driver's  
 seat. The engine is economical to  
 operate, since no energy is wasted when  
 it is standing idle.



Short-Coupled Switch Engine Operated with a Gasoline  
 Motor for Use in Railroad Yards

*Carl Davis R. Kutzbach, Chicago, Ill. 1934  
 Berlin, La. 1934  
 Bremen, Germany*

*See May 1934  
 6 p. 7*



Philip Gordon - cannot locate



This Piano Transforms Sound Waves into Color Tones, Thus Making the Music Visible, a Different Shade of Light Representing Each Note

## PIANO MUSIC IS MADE VISIBLE IN A VARIETY OF COLORS

Piano music can now be seen as well as heard. After eight years of experimenting, a concert pianist has made an instrument known as a "musiclite," which operates from the piano keyboard to transform sound waves into color tones. As the keyboard is fingered, the sound waves are registered on a panel, a different shade of light indicating each note. Among other things, the apparatus is expected to help deaf persons appreciate the piano and its possibilities, since they are able to "hear" the piano in terms of visible color.

## NAME YOUR SOUND—HERE IT IS FROM "TALKIE" LIBRARY

When the "talkie" picture of the future needs sounds of an airplane taking off, chickens cackling, surf roaring, a door closing or a dish breaking, it will only be necessary to obtain the proper film from a sound library now being gathered by the General Electric company and run it at the proper time instead of trying to imitate the desired noises. Whether the applause of fans at a prize fight or the hand-clapping of a crowd at the opera is wanted, the proper sound film for the radio drama, which must depend on sound alone,

will be available. Sound films are not always easy to obtain, however. Recently it was desired to broadcast the clucking and cackling of poultry. A coop of chickens was brought to the studio and corn was sprinkled on the floor near the microphone connected to the sound recorder. The chickens, however, developed stage fright and, in an effort to get them to cackle, someone "shooed" them. The resulting noise was found to sound like a midnight raid on a hen roost. Finally, the hens were induced to pick the corn from the floor, and another

film was made, but the rapid pecking was reproduced like a tap dance. The problem finally was solved by inducing the chickens to take another meal of corn scattered on a felt mat, and the sounds of clucking hens are now indelibly recorded.

## HEADREST STRAPS FOR AUTO ADD TO RIDING COMFORT

Those who like to nap as they ride now may do so in comfort by using a headrest device for automobiles or busses. It is made of soft, flexible material which fits the head snugly, covering the ears to keep out noise, while shock absorbers protect from jolts. Suspension straps attached to the roof hold the rest in place, one being provided for each passenger.



Headrest for the Auto Which Is Suspended from the Roof of the Car by Means of Straps

M.A. Montenegro,  
Tampa, Fla.

Wes. Y.

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By GEORGE W. GRAY, 703 W. 11th St., Austin, Texas

**T**HE THRILL of discovery came to a little group of government ocean surveyors recently. They were running a line of soundings through a stretch of sea about 170 miles off the coast of Massachusetts, when suddenly the flashing light of the fathometer began to move around the dial in the direction which indicates increasing depth. Steadily the indicator went down until, within a few minutes and in a distance of less than two miles, the sea bottom had dropped from a depth of 450 feet to a depth of 2,520 feet.

What was it, this sudden shelving off of the continental slope into deep sea when, judging from their direction of travel, it should have been getting shoaler? The survey vessel proceeded on its way in a straight line. Presently the sea bottom began to lift as abruptly as it had dropped before. Soon the depth was only 504 feet. Clearly here was a scar in the sea, a valley, a submarine gulch with precipitous walls rising more

than a quarter mile on either side of it.

The ensuing job of surveying that gulch, plotting it in exact detail on the chart, has been an interesting and lively task. And the results of the work, contributing to the greater accuracy of navigation charts of one of the most-traveled regions of the north Atlantic, have been hailed as a boon by captains of ocean liners, fishing schooners and trawls, and all who go down to this stretch of sea.

The discovery was made by the "Oceanographer." This trim powerful survey ship was formerly the "Corsair," private yacht of J. Pierpont Morgan. Several months ago, when Mr. Morgan's new yacht was delivered, he offered the old vessel to the government. This addition to their fleet has greatly strengthened the work of our ocean-bottom mappers.

The "Gulch or Valley of Mystery" looks, when sketched on the chart, something like a crooked finger. About three miles wide at its base, it notches north-





Sounding and Plotting the Ocean Bottom by Radio aboard a Ship; Right, Contour Map Showing Ocean Depths

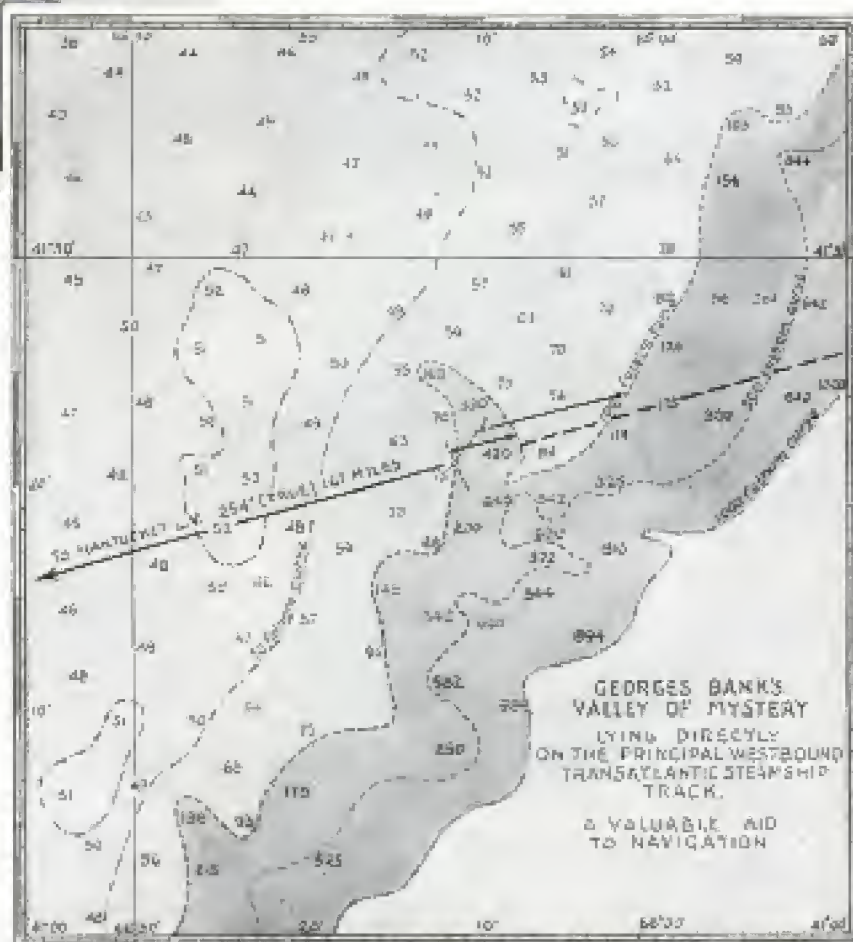
ward into the more elevated seabed for a distance of nine miles. And there it stops as abruptly as it begins—a deep, narrow gash in the vast plateau under the sea.

How it originated is a riddle. There are many ancient river beds now submerged, relics of past geological ages when the coastline extended far out where now there is only open ocean, and when much that is now submerged was dry land. Several such river beds have been traced off the Pacific coast, and on the Atlantic front the former course of the Hudson river can be followed for miles from its present mouth out into the sea. But this new valley cannot be cataloged as an old river bed. It ends too abruptly. Nor does it look, or "feel," like a break in the ocean floor—the result of an earthquake or other crustal disturbance. Apparently it is old and already well settled.

The valley notches into Georges bank. This broad undersea plateau—it extends eastward for about 180 miles—is a favorite hunting ground for the fishermen of Boston, Gloucester, and even more dis-

tant ports of the Atlantic. Accurate soundings are highly important to them because certain kinds of fish feed at certain depths of bottom; therefore, the more detailed the bottom charts are, the surer the fishermen are of good catches.

In making soundings, it is no longer necessary to stop the ship, drop the lead, and then spend minutes, sometimes hours, heaving up the long wire line. The modern survey vessel sounds continuously while it steams forward at full speed.



Submerged in the water and attached to the underhull of the vessel is a small device which is vibrating. The sound waves given off by this vibrator travel through the water to the sea bottom, there they are reflected and sent back to the top of the water.

Another device, a microphone, also attached to the ship's hull under the water, picks up these vibrations and carries them by wire into an ingenious electrical apparatus, the fathometer. This latter instrument has an uncanny skill. It knows—or it is set to know—the speed of sound

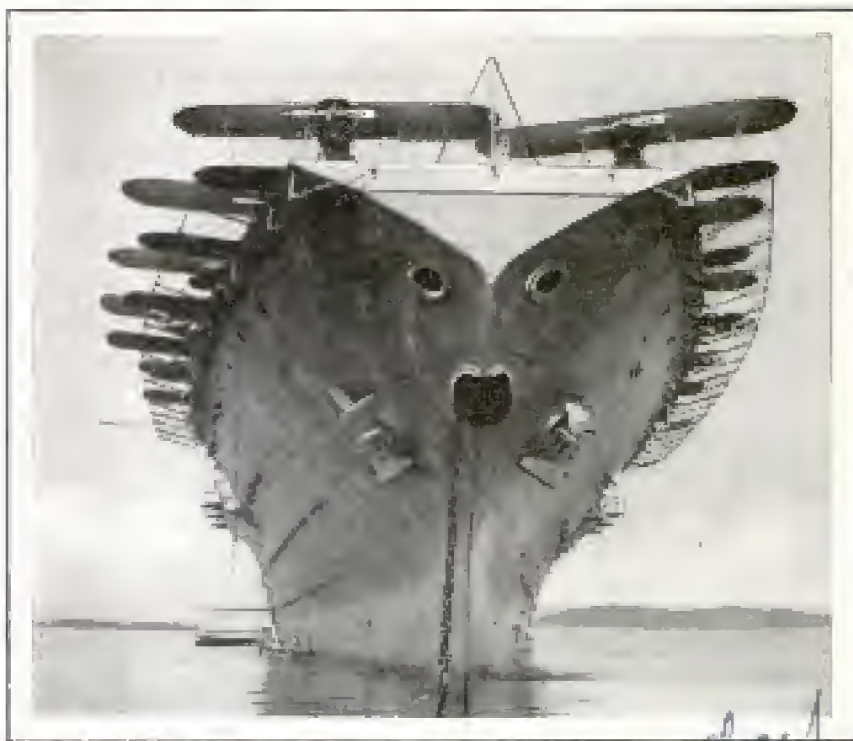


in sea water. By measuring the time elapsed between a vibration and the arrival of its echo at the microphone, it is able to tell how deep the bottom lies at that point.

But how do you locate the point? A sounding requires three dimensions: depth, latitude and longitude. Unless the surveyor whose fathometer tells him that the ocean is ten fathoms deep here and 100 deep there, can also ascertain quickly just where these depths are with reference to north-south and east-west, it is clear that his sounding cannot be charted with accuracy and therefore is of no value to navigation.

The coast and geodetic survey has worked out a way of quickly determining position called the radio-acoustic method. This requires the maintenance of two radio stations either on shore or at anchorage, the positions of which must be accurately known. The receivers of the radio stations are microphones submerged in the sea close by. The survey ship carries a supply of explosive bombs. Whenever it wishes to determine its position, to locate a sounding, it drops one of these bombs into the water. The bomb explodes, and sound waves from its explosion, when reaching the microphones, are picked up by each microphone and transmitted to its near-by radio station.

The impulse thus received is then instantaneously and automatically broadcast by the station, and thus the signal reaches the ship by radio. The difference in time to the nearest hundredth of a second between the explosion of the bomb and the arrival of the radio signal tells the ship's officer how far he is from each station. Knowing the position of his radio stations, he is then able to draw lines from them corresponding to the elapsed time of each signal, and where these two lines cross is the position of the ship on the chart.



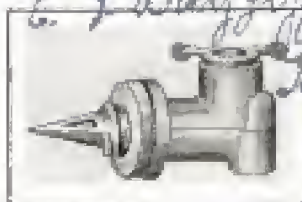
Unusual View of the "Lexington," Aircraft Carrier of Navy; Note the "Eyes" and "Mouth" in the Bow, Adding to Grotesque Appearance

### MOTHER SHIP FOR SEAPLANES LIKE A WINGED MONSTER

Bearing a remarkable resemblance to some gigantic winged monster of prehistoric times, an unusual head-on view of the aircraft carrier "Lexington" was obtained recently during fleet maneuvers. Openings in the bow look like the eyes and mouth of some sea giant, while the wings of seaplanes, extending over the sides, increase the grotesque effect.

### TAP FOR CANS WILL NOT LEAK AND IS EASILY INSTALLED

Easily and quickly applied to any size of metal can, a convenient tap or spigot will not leak and eliminates both waste and muss in handling liquids in such containers. The sharp point of the tap is forced through the lower side of the can until a screw thread comes in contact with the container. It is then turned until a cork gasket is tight against the side of the can and the handle of the tap is upright.



*E. J. Way*

*A. E. Wood Co.*  
5818 Santa Fe Ave.  
Los Angeles, Calif.





Handy Disk-Shaped Number Index Which Attaches to Mouthpiece of an Automatic Telephone

### PHONE INDEX FOR MOUTHPIECE SHAPED LIKE A DISK

Automatic telephones with a handy index attached to the mouthpiece recently were exhibited in London, where they are proving popular. The index is in the form of a disk with many leaves, each leaf containing a letter of the alphabet.

### STRANGE TEETH OF ELEPHANTS MOVE FORWARD IN JAWS

Some animals have a dental arrangement that, at first glance, man might envy. Baby elephants, for instance, have four back teeth, two uppers and two lowers. These primary teeth are pushed forward in the jaw by succeeding teeth back of them, each new tooth having more layers of enamel than the preceding one. This process continues until the animal has twenty-four teeth, although it rarely uses more than two to a jaw at any one time. The old teeth deteriorate as they move forward and finally are worn down. Beavers, muskrats, rabbits and other rodents have incisors which never stop growing, even if broken off. At first glance this might seem an admirable arrangement, but the teeth sometimes grow faster than they can be worn down by the animal, thus resulting in deformation and sometimes even in the death of the animal.

### MODEL OF FIRST LOCOMOTIVE BROUGHT TO AMERICA

A. 723

After journeys all over the world for exhibition purposes, one of the first working miniatures of a locomotive has been brought to this country where it probably will remain. The original of the model was running in 1812, several years before Stephenson made his trial run in the "Rocket." Necessity, the mother of invention, was responsible for the locomotive. A British colliery owner had a contract to furnish coal to the people of Leeds, and the cost of horse feed became so high that he feared he would be unable to continue hauling at the agreed price. In his dilemma, he consulted Matthew Murray, a foundry owner, and the latter set to work on a locomotive to haul the coal. To give traction in hauling a load up a steep grade from the mine to the town, a cogwheel was placed on the engine with a rack on one of the rails to engage it. The locomotive had two double-acting cylinders set at right angles to the crankshaft so, when one piston was at the end of its stroke, the other was at midstroke. The engine hauled about ninety tons. After finishing the first locomotive, Murray built a model to a scale of one-twelfth, mounted it on a piece of rack rail and used it to demonstrate to other colliery owners the efficiency of the iron horse. It is this model that has been brought to the United States.



Model of Early Locomotive Which Was Running Years Before the "Rocket" Made Its Appearance

and display at Rosenbach & Co. Philadelphia



## WARSHIP RAISED BOTTOM UP AND TOWED TO PORT



Here Is a German Cruiser of World War Days, Upside Down but Afloat; the Scuttled Boat Was Brought to the Surface Bottom Up, and, Despite the Unusual Position, Was Towed into Port

Ordinarily, one of the prime requisites for operating a battleship is to keep it right side up, but this was not the case with the salvage crew which recently raised the famous cruiser the "Kaiser," which was scuttled by the German navy during the world war. The vessel was brought to the surface bottom up, and in this unusual position was floated into an English port.

### MILLION POUNDS OF BULLFROGS RAISED IN LOUISIANA Q. 736

Bullfrogs are a source of considerable revenue in Louisiana, the numerous rivers, bayous and lakes with adjacent swamps and marshes providing an ideal breeding place. The frog industry has become so well established that laws have been passed to regulate the size that can be caught for marketing. About 400,000 frogs with a total weight of more than 1,000,000 pounds, were sold on the market

in 1930 at prices ranging from \$3 to \$4.50 a dozen. Frogs under four and one-half inches long now cannot be sold on the market, but can be caught for propagating or for scientific purposes. Thousands of natives are engaged in catching the croakers during the spring season. They are caught at night, the catcher walking in the water near the bank with a spotlight which blinds them temporarily, and the hunter then picks them by hand from the bank and deposits them in a sack, often bagging more than 100 in a few nights. The frogs are packed in ice and shipped to the various markets, the skins being used in making glue and also for purses. Louisiana frogs are also being sent to Japan and Argentina where frog farms are being established.

ⒸSchool teaching by radio was tried in Norway recently when pupils of 150 schools listened to an instructor broadcasting from Oslo.

*Louisea Dept. of  
Conservation*



Cont. Frank H.  
Westfall 6088 4M  
Duluth Minn

## EARS FOR BRIDGE AMPLIFY BOAT SIGNALS

To prevent any possibility of lake boats crashing into a lift bridge at Duluth, Minn., a pair of mechanical ears have been built at the entrance of the Duluth-Superior harbor. This signal-amplification apparatus will enable operators of the lift span to hear the whistle of boats three miles distant. Because of a strong undertow and peculiar conditions of the outer harbor, boats cannot turn about or stop after reaching a point about one-half mile from the bridge. To overcome the noise of the foghorn and the pounding of the surf, engineers decided on a two-stage amplification system with horns



THE CLERMONT 5 MILES PER HOUR—1807



GAR WOOD 102.5 MILES PER HOUR—1931

Above, the "Clermont" with a Speed of Five Miles an Hour in 1807; Below, "Miss America IX" with a Record of Over 100 Miles an Hour

## FASTEST CRAFT EVER FLOATED COMPARED WITH "CLERMONT"

Intricate engines of propulsion are carrying man ever faster on land and in the air, and the increase in speed is being matched by the advances in watercraft. When Gar Wood traveled more than 100 miles an hour in "Miss America IX" at Miami Beach recently to set a new world speed-boat record, the event probably created less astonishment than the feat of Robert Fulton less than 125 years ago. Fulton started the water speeding when his "Clermont" snorted across the Hudson in 1807 at five miles an hour. A year ago, the "Europa" crossed the Atlantic at a pace of over thirty-seven miles an hour, and a few months later the late Maj. H. O. D. Segrave broke the existing speed-boat record in "Miss England II" by going over ninety-eight miles an hour. "Miss America" set a two-way mark of 100.6 miles an hour to break one record, then smashed her own mark a few minutes later with another two-way spin, averaging 101.154 miles an hour.

atop fifty-foot steel towers to gather the sounds. One tower is located at the end of an entrance pier extending into the lake, a 2,000-foot cable conveying the amplified reproduction of the ship's whistle to a radio-receiving set in the bridge-control room. The second tower stands inside the harbor.

## DESK MOISTENER FOR LABELS OPERATED WITH ONE HAND



For the mailing, packing or shipping room, or for desk use, a compact and portable moistener for gummed labels or envelopes can be operated with only one hand. The label or en-

velope is pushed under a roller with the fingers, and pulled through the roller with thumb and forefinger, being moistened automatically as it passes.

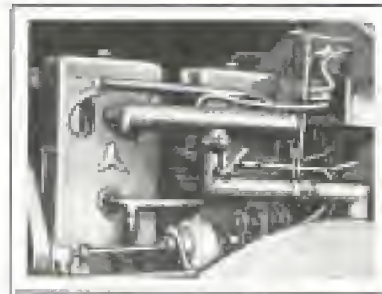
Waters Package  
Machine Co.  
Lincoln, Ill.

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## TRUCK BURNS WOOD AS FUEL INSTEAD OF GASOLINE

Wood instead of gasoline was used as fuel for a truck which recently hauled a load of merchandise weighing 4,500 pounds through a desolate region of South Africa, the entire trip covering nearly 600 miles. While the strange fuel represented a large saving in expense, the principal reason for choosing it was that gasoline was not available along the route and the truck could not carry a large supply of gasoline in addition to its pay load over the rough roads. Its average speed for the trip was nearly fourteen miles an hour, twigs and brush gathered along the road being fed to it as demanded. On the last stage of the journey, 900 pounds of wood were consumed at a cost of less than \$3.25, while gasoline to make the run, at African prices, would have cost over \$29. The



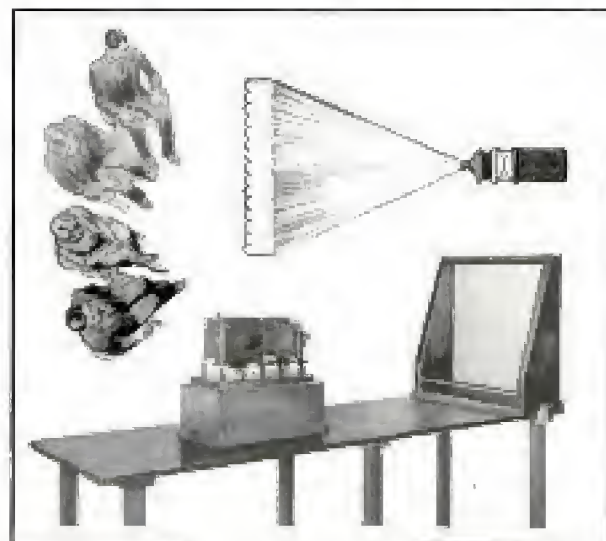
Truck Which Uses Wood as Fuel Instead of Gasoline, and a View of the Engine; It Also Will Consume Corn Husks and Other Waste

truck had a four-cylinder motor that consumed either gasoline or wood and the vehicle had a capacity of five tons

on smooth roads or three tons for cross-country runs. The motor functioned not only with wood, but with cornhusks, sisal, coconut shells and other inflammable substances gathered along the route. No water was required in the radiator and the motor was started by ordinary means.

## SCREEN TO GIVE PICTURE DEPTH IS SUCCESS IN TESTS A. 663

Although still in the development stage, a screen intended to give the illusion of depth to still pictures projected onto it



Apparatus Which Gives Depth to Still Pictures, and Drawing Showing Principle of Operation

has been successful in laboratory tests. Images in three dimensions have been shown on this screen which is about two feet square, by Dr. Herbert E. Ives, of the Bell Telephone laboratories. Thus far, only still pictures have been shown, but it is hoped that eventually the same principle can be adapted to the movies. Because of the expense involved in making the extremely accurate apparatus, not even the still-picture process is as yet available commercially. The screen consists of 200 rods, cylindrical in cross section, arranged side by side and pressed together, so the surface appears corrugated. Projection is from the rear, an ordinary lantern with a very accurate lens being used. When an image is cast on the celluloid screen, the observer looks at something flat, but each eye sees from a slightly different angle, thus creating a stereoscopic illusion.

Antlers of the extinct Irish deer sometimes branched to a spread of twelve feet.

Cmt. Lem Islassman  
55 W. 86 St. New York







## SWITCH REPLACES HOME FUSE TO GUARD WIRING

For the protection of electrical circuits in the home and to provide a convenient means for restoring service after a circuit has been overloaded, a combined switch and circuit breaker has been developed which eliminates all dependence upon fuses and avoids the inconvenience of replacement attending their use. This device can be operated by an ordinary "off" and "on" switch to control the circuit as desired, and in addition has built into it a trip mechanism which causes the switch to open automatically if the current exceeds the maximum for which it has been set. The tripping is not instantaneous, except in case of a short circuit, otherwise being in inverse ratio to the amount of excess current passing through it. This allows a slight overload for a short time, as when several electrical appliances are operated simultaneously, without any interference. The switch is of the toggle type with the fixed center mounted on a swinging arm which is latched under a catch on the bimetallic thermal over-current unit. As the current passing through the unit increases, the bimetal,



composed of two metals of unequal expansion, bends until the latch is released and opens the switch. After the overloading has been corrected, it is only necessary to set the switch again.

Even if the switch is closed with the circuit overloaded, it only opens again, tripping free of the handle; hence it is impossible to hold the circuit closed when it is dangerously overloaded.

## HEIGHT OF CLOUDS MEASURED BY SMALL SEARCHLIGHT

To enable airports to measure accurately the height of clouds above the ground, a powerful searchlight has been made which utilizes a comparatively small bulb. The light projects a very narrow beam with such intensity that a newspaper can be read five miles away by its



Small but Powerful Searchlight for Measuring Cloud Heights; It Casts a Beam Five Miles

rays. Although the lamp used is only five or six times the size of the ordinary bulb used in the home, efficiency of the reflector system compensates for this. The principal glass reflector is in the form of a parabolic mirror which throughout its surface is focused directly on the lamp filament. Three days of calculation were required to design the mirror alone. The light, containing a 420-watt bulb, produces 1,840,000 candlepower.

## AUTOMATIC FAN-BELT FITTER SHOWS SIZE FOR AUTO

Fitting a fan belt to an automobile by trying it on the car no longer is necessary, as one belt manufacturer provides an automatic gauge for this purpose. The

fitter is slipped over the pulleys and the stock number of the belt of right size is indicated at the point where the ends of the fitter lap. The instrument saves much time, as it is necessary to place only one belt on the pulleys, with assurance beforehand that it will fit.

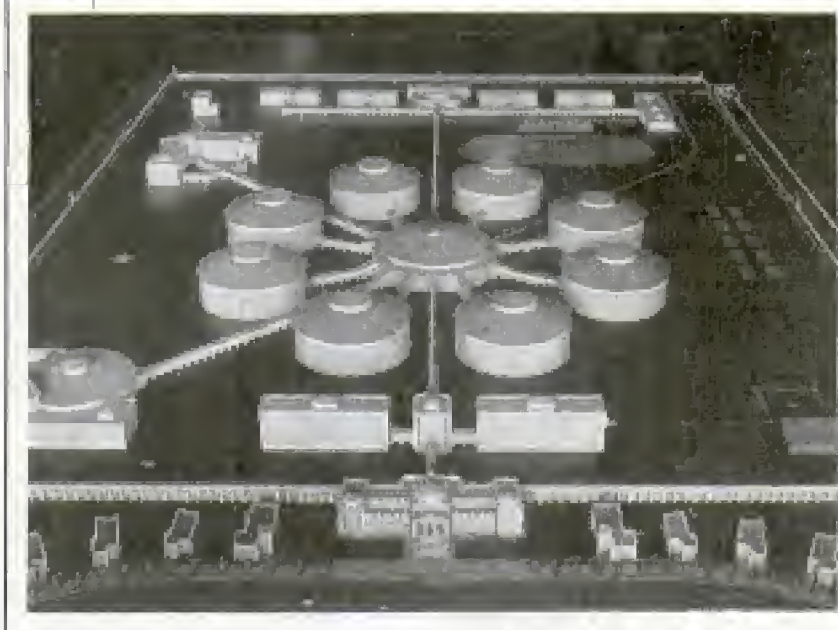


The Balfast Rubber Co.

Westinghouse Electric & Mfg. Co.  
2209 Ashland Road  
Cleveland, Ohio

The Balfast Rubber Co.  
Cleveland, Ohio





© Publishers Photo Service

Model of Modern Prison Planned for Cuba; Circular Buildings Cluster around a Central Structure, and Are Connected by Covered Passages

## PRISON OF CIRCULAR BUILDINGS IS PLANNED FOR CUBA

One of the most modern penal institutions in the world is being planned for Cuba, the form of construction being as unusual as the prison itself. A plaster model of the prison layout shows a group of eight circular buildings formed around a central circular structure. Like the spokes of a wheel, covered passageways connect the several units. The greatly overcrowded condition of state and federal prisons in the United States was emphasized by recent figures of the census bureau, showing the daily average prison population in 1927 was nearly 13,000 more than the normal capacity, given as 67,563 persons. In Ohio, for instance, the normal prison capacity was 4,582 persons, but the average daily incarceration in 1927 was 7,062, or over fifty per cent more than there was space for, while in Michigan average prison population was seventy-eight per cent above normal capacity. In only fifteen states of thirty-nine from which reports were received was the average population less than the capacity.

■ Buenos Aires has a new subway four miles long.

## FLATIRON IS MOST USED ELECTRIC APPLIANCE

Electric refrigerators advanced to first place as the most important appliance in domestic electric service in 1930, considered from the standpoint of current consumption. At the close of the year, it is estimated, there were 2,625,000 refrigerators in use among the 20,400,000 wired homes in the United States, and the total consumption of current by this type of appliance increased about forty-five per cent over the previous year, the total electric bill being estimated at \$48,600,000. The flatiron is still the most widely used electric appliance in point of numbers, with more than 13,000,000 in service.

## TENT CARRIED ON AUTOMOBILE FOR CAMPING TRIPS

One of the unusual vehicles exhibited at the international automobile show in Berlin was a specially built automobile on which was mounted a tent already set up. The equipment is intended for camping parties as the tent can be hauled from place to place on the car, and is ready for use as soon as the destination is reached.



Automobile for Campers with the Tent Set Up and Ready for Use as Soon as the Destination Is Reached



## ANGLERS CAST FOR TROUT IN ARTIFICIAL POOL

Walsheire Trout Co. Ltd. at Fairview Ave. Los Angeles. Calif.



Artificial Trout Pool in Los Angeles, Which Is Kept Stocked with 10,000 Fish, and Some Anglers Trying Their Luck

Along one of Los Angeles' busiest streets is a fisherman's paradise, 10,000 live trout swimming about in a pool 140 feet long simply waiting to be caught. All the city angler needs is a little change to enjoy a full day's fishing almost in the heart of the town, for he is even provided with tackle. The pool, with a capacity of 224,000 gallons and a waterfall at one end, was built on ground formerly occupied by a miniature golf course, and the idea has become as popular as midget golf. Fifty anglers can use the pool at one time, and there are no disappointments, because the supply of fish is constantly being replenished. The waterfall lowers the temperature of the water, which is treated to protect the fish from the direct rays of the sun, the murky appearance also making the fishing more of



a sporting proposition. The patron pays a tackle fee and a small fee for each fish caught. He may take the fish home after having them cleaned at the pool, and open-air grills are to be installed where patrons can cook their catch on the spot. The fish are transported from a mountain hatchery, and anglers recently took 15,000 trout from the pool in one month.



a-124

# The Passing of the



By DON GLASSMAN

55 W. 86th  
New York

WHAT hath God wrought in the telegraph industry? The single voice on the wire with its staccato click-clickety-click-clack gives way to an automatic babble which no Morsemans understand, which robs telegraphy of romance and leaves an army of veterans rueful and vexed.

While Morsemans bent to dignified labor and transmitted messages bearing the news of wrecks, floods, famines, wars and stock markets, the subtle genius of invention invaded the telegraph rooms, installed a new circuit in a strange contraption and set everybody agog with its gibberish—the theme song of “Simplex and Multiplex.”

Eighty years ago the Morsemans heard the first notes of automatic telegraphy. About 1850, House's printing telegraph was serving the eastern third of the United States with an automatic sender. The invention transmitted messages in a code of its own which were received on paper ribbon. But former Morsemans stood at the helm of America's communication industry and were gaining rapid control of the railroads. Hence, the printing telegraph found few friends. Never before had sentiment struck so boldly at labor-saving invention.

Samuel F. B. Morse was the patron saint of telegraphy. For three-quarters of a century a machine dueled with his spirit. The captains of industry were loathe to see their friends, the brass pounders, pushed aside. The great apostle of modern invention, Edison, had been a railroad telegrapher for years. Edgar Calvin, president of the Union Pacific, was another. Robert Ewing, the newspaper publisher; David Sarnoff, president of the Radio Corporation of America, and Samuel Insull, the public-utility magnate, held compassion and sympathy for their fellow Morsemans.

Until a few years ago, most high railroad and telegraph posts were filled from the ranks of Morsemans, so that a convention of communications and transportation officials was, in effect, a get-together for old Morsemans. Timesaving, labor-saving and thought-saving machinery could not shake their faith in manual telegraphy. If, as some suspected, a change to automatic telegraphy was inevitable, others would have to effect it. The decision rested with a new generation. And at a sacrifice of pride, even Morsemans admit that the decision is just, that hundreds of thousands, even millions of dollars can be saved by automatic



# Brass Pounders

telegraphy. Competition in telegraphy waxed hot a few years ago. A new generation began to weed out old methods, and the Morsemen saw the introduction of two robots—simplex and multiplex—which zip off messages at sixty words a minute. Besides which, fourteen messages may be sent at once in each direction over a single circuit—a total of twenty-eight.

Instead of telephoning a message to the telegraph office or calling a messenger,



a stenographer now merely types the words. No sooner does her finger touch a key, then the letter is impressed upon paper tape. Instantly it goes to the dispatcher's office via high-speed endless belting, and is sent on its destination without delay.

Western Union has installed such machines in 8,000 offices. The complete circuits, therefore, involve 16,000 simplex units. Offices handling a great deal of telegraph correspondence have the benefits of multiplex installations on which four messages travel in each direction simultaneously.

Boys in the latter half of the nineteenth century remember the lure of the wire. A chance to learn telegraphy was the ambition of imaginative men. Here was a



Above, Operator Typing Message on a Keyboard; It Is Transmitted and Automatically Printed on a Tape, Then Gunned to Receiving Blank as at Left

language in dot and dash, which only the initiated could understand. One had a chance to transmit messages of extreme importance. For saving the life of a child, Edison was awarded the opportunity to learn Morse.

Multiplex may have a thousand messages per strand of wire, but they can never overawe the old Morsemen. For stock-quotation work, for bidding and buying, manual telegraphy has advantages, and many brokers are heartily committed to its continuation. And although automatic machinery can now be adapted to every kind of radio and telegraph transmission, the human hand is essential for testing, regulating and maintaining the highly organized communication networks. Some high telegraph officials believe that Morsemen will never completely disappear from the telegraph business.

The telegraph companies formerly taught Morse in special schools scattered all over the country. As the volume of business grew, they doubled the number of recruits. Then came the demon speed.





© Patriot Pub. Co.

Above, One of General Grant's Field-Telegraph Stations; Right, Sender and Receiver of First Telegraph.

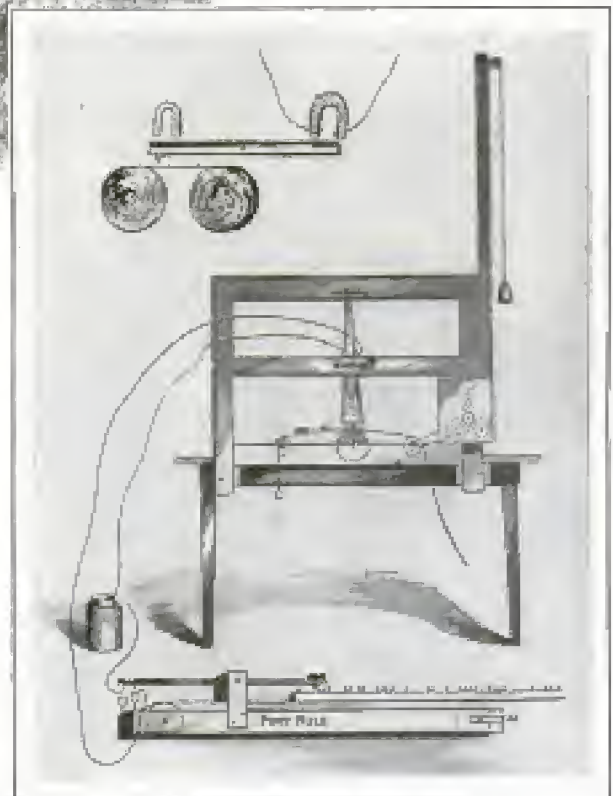
The public demanded speed, not sentiment. Overnight, the Morse schools were shut down. Postal Telegraph is not training new Morsemen, and Western Union has only a few dozen trainees. Everywhere multiplex schools are springing up, and armies of girls are taught to type messages on three-bank keyboards. Their salaries range from \$100 to \$180 per month. Which leaves the Morsemen consoled, after a fashion, because a good "op" commands from \$250 to \$300 a month, and many brokerage houses are glad to pay the extra toll to Morsemen even though they send only half as fast as automatic printers. But the great revolution, anticipated for eighty years, is here; eighty-two per cent of present-day wire traffic is automatically handled, and each year the percentage rises.

Whatever may happen, the Morsemen are possessed of a grand heritage. They saw the country through grave crises and aided in empire building no less than the men who laid rails and fought battles.

Every year the Old Time Telegraphers' and Historical association assembles in some large city and attracts Morsemen from all over the country. Old and bent, gray and weatherbeaten, but hale and hearty, the "ops" tap their memories and swap a pack of fetching yarns.

There are uncanny stories of railroad trains halted two seconds before the inevitable wreck; of ships rushed to help-

less vessels; of press circuits so hot with news that the wires cooled for a week. The press file on the battleship "Maine," blown up in Havana harbor, ran up to ten million in one week, and here are the "ops" who stuck by their brass pounders until every last word was in type: the file on the



"Titanic," with its heart-breaking list of fatalities; the billions of words necessary to carry on the world war. Morsemen performed yeoman's service.

If duty took you to a spot in the desert, a hundred miles from any town, and you had only a Morse key for company, no doubt your attachment to it would not be easily forgotten. The Morsemen knitted a fraternity by talking hack and forth on the wire, exchanging news and personal notes, and frequently learning the news of the world before the daily papers. When the day was over, and the last train had been safely dispatched, they took a last turn at the key and signed off with "73," the keynote of good friendship—"Best regards."

It is a coincidence that the telegraph,





Operator Using a Siphon Cable Recorder; He Reads the Wavy Lines, Oscillations above the Lines Representing Dots, and Those Below, Dashes; It Has a Capacity of 500 to 600 Words a Minute

as originally invented by Morse, employed both machine sending and receiving. The characters in dots and dashes were made of metal. The receiver reproduced the characters on a ribbon of paper. These instruments were abandoned when it was found that the operators became so familiar with the code that they could read it by ear.

When the telegraph, the patent applications for which were filed in 1837, was first revealed to the public, ridicule was heaped on the inventor, and his instruments were slightly referred to as "scientific toys." While seeking the aid of congress to build an experimental line, Morse managed to keep from starving by taking a few pupils in painting. An incident told by one of his pupils, describes the poverty of Morse at this time: "One evening Morse approached me and said:

"'Well, how are we off for money?'

"'Why, professor,' I answered, 'I am sorry that I have been disappointed, but I expect a remittance next week.'

"'Next week,' he repeated sadly, 'I shall be dead by that time.'

"'Dead, sir?'

"'Yes, dead by starvation.'

"I was distressed and astonished, and

said: 'Would ten dollars be of any service?'

"'Ten dollars would save my life. That is all it would do.'

"I paid the money and we dined together, Morse saying: 'This is my first meal in twenty-four hours.'

In 1838, the father of Alfred Vail, who had supplied \$2,000 for experiments, became impatient and demanded proof of the invention. He wrote this message, "A patient waiter is no loser," and asked his son to send it to Morse, stating that if he could do so, he would be satisfied. The test was a success.

Congress later appropriated \$30,000 for a telegraph line to Baltimore. This was opened in 1844, the first message sent being written by Annie G. Ellsworth, daughter of the commissioner of patents. The message read: "What hath God wrought?"

Morse offered his invention to the government for \$100,000, but although they voted \$8,000 for maintaining the original line, they declined to commit themselves further. Nevertheless, telegraph lines began to multiply. Morse's patents were infringed, but were upheld by the courts.

The first great improvement in the telegraph was made in 1858 by J. B. Stearns,

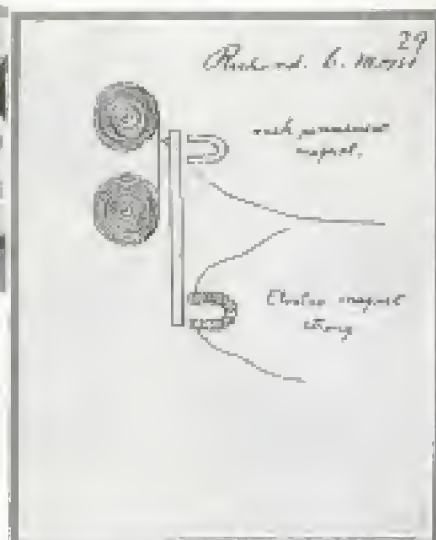
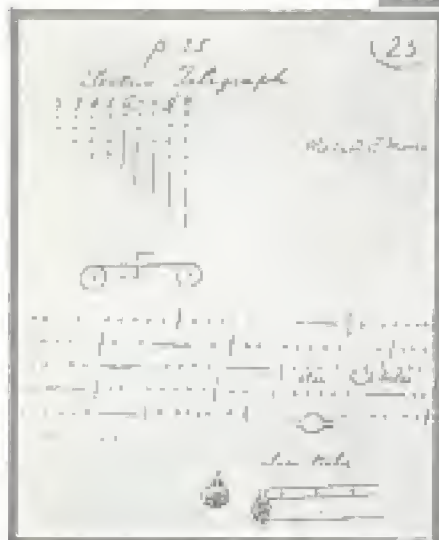


of Boston. He introduced duplex telegraphy, a system by which two messages, one in each direction, could be sent over a



Courtesy Western Union Telegraph Co.

A Striking Contrast between the Early and the Modern; at Each Side Are Sketches and Messages from Morse's Scrapbook, and Above, Sending a Message on a Modern Simplex Instrument



single wire at the same time. This he accomplished by arranging relays at each end of the line which would respond to incoming but not to outgoing signals.

One of the first "brass pounders" was Thomas A. Edison. After learning the code, he went to New York where he borrowed a dollar to tide him over till he could get work. Much of his spare time was spent in the offices of the Gold Indicator company which distributed stock quotations.

One day, in an emergency, he repaired a bad break and as a result was given a position at \$300 a month. After he had taken out a large number of patents on improvements on the tickers, the head of the company offered to buy these inventions. Edison had intended to ask \$5,000 and, if necessary, to come down to \$3,000. But, when the moment arrived, he did not have the nerve to name the larger sum, so he asked the president to make an offer. The latter suggested the sum of \$40,000. "This caused me," said Edison, "to come as near fainting as I ever got. I managed to say that I thought it was fair."

With this money, he began working on an automatic system of telegraphy. It included a hand punch for perforating a moving tape which was passed through an automatic transmitter. Whenever a

hole came in the tape, an electric contact was made and an impulse sent over the line. At the receiving end, an automatic printer recorded the signals. This operated at 3,500 words per minute.

Then came Edison's quadruplex telegraphy, which enabled him to send four messages over a single wire at the same time, two in each direction. In this system, he combined two sets of instruments. One would respond only to a change in the strength of the line current and the other set only to a change in the direction of the current.

The first real printing telegraph was the invention of David E. Hughes, a master of music, in 1855. Prof. Henry A. Rowland, of Johns Hopkins University, followed with a printing telegraph which could send eight messages simultaneously.

Later came the remarkable Pollak-Virag telegraph which has actually reached a speed of 100,000 words an hour. The signals are produced on a tape and are recorded by means of a beam of light on a photographic sheet.

## CAMELS REPLACED BY AUTOS TO CARRY PILGRIMS

American automobiles are replacing camels in popularity in transporting Moslem pilgrims to Mecca. During the first part of the current pilgrim season in the Kingdom of the Hedjaz, covering about a month, more than 8,500 out of a total of 18,000 pilgrims made the trip from Jedda to Medina by automobile.

Reported by Automobile Trade Association, U.S. Dept. of Commerce, Cairo



Prof. Thomas Hunt Morgan,  
Director, William L. Kitchoff  
Biological Laboratories

955

## FISHES' SECRET OF COLD LIGHT IS NEARING SOLUTION

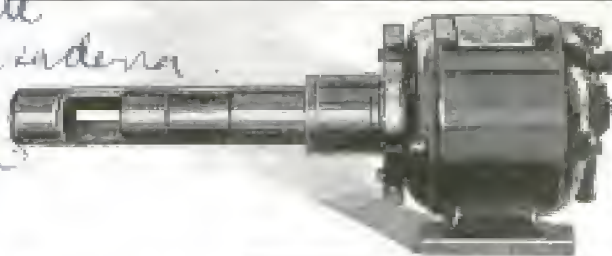
Science is a step nearer solution of the mystery of "cold light," such as produced by fish to give the ocean a phosphorescent appearance. Recent zoological experiments have established this light is a reaction in water of a chemical substance produced by fish. This substance is believed to be akin to albumen in nature, and is of two kinds, one of which is soluble in cold water and the other in hot water. When these solutions are made, cold light is produced instantly. All efforts to reproduce the substance artificially have failed thus far, but it is hoped this may be accomplished through the recent discoveries.

## MINIATURE THEATER IN STORE ENTERTAINS CUSTOMERS

One California drug store dispenses moving pictures along with its other stock. To stimulate interest in home moving-picture equipment, the proprietor built a miniature movie theater in one corner of the store which is complete in every detail, even to stage fittings. The little theater seats six persons, and lighting and stage-control effects all are worked from the operator's position beside the projecting apparatus.



Miniature Movie Theater Installed in the Corner of a Drug Store; It Seats Six Persons.



Revolving Eyepiece Which Offers X-Ray Views of Internal Organs in Three Dimensions

## X-RAY WITH THREE DIMENSIONS TO AID MEDICAL SCIENCE

Making use of a revolving eyepiece which gives the observer a stereoscopic effect, an X-ray apparatus that shows the organs of the body in motion in three dimensions has been demonstrated at the California Institute of Technology. The pictures of the human anatomy as seen with this instrument are not flat, but stand out in relief, showing length, breadth and thickness. With the apparatus it is possible to determine exactly how far a bullet is buried in a patient's body, thus eliminating the probing that has been necessary heretofore. The apparatus uses two X-ray tubes which produce a shadowgraph on a fluorescent screen. These shadowgraphs are first seen with one eye, then the other, in rapid succession. The eyepiece consists of a revolving shuttle that opens alternately for each eye.

In a test of the keeping qualities of flowers, those that lasted longest were roses, orchids, lilies, carnations, chrysanthemums, spring flowers and calendulas.

2-5-98  
Los Angeles. Calif

at Pasadena

Rudolph Hartman  
Sierra Madre Calif



# FILMING ONE OF THE WORLD'S GREATEST BRIDGES

a-612



## By A CAMERAMAN

Many and diverse are the occupations of the film cameraman in these days of unusual sounds and unusual angle photography, but the greatest thrill of my life, exceeding even experiences in a stunting airplane, was the scaling to the top of the giant spans of the world-famous Forth Bridge in Scotland. Altogether there is a mile and two-thirds of this truly amazing structure, which rises to a maximum height of nearly 400 feet above the water, or a climb of about 240 feet for me and my companion. This does not seem to be much, but as the only way to the top is along the narrow, steeply slop-



Firth of Forth Bridge in Scotland, and Painters at Work on Top of the Towering Structure

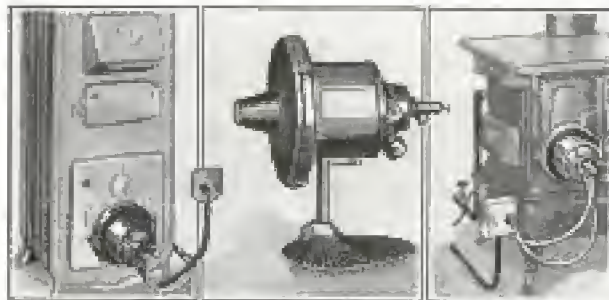
ing girders, which seemed to be only a few inches wide, and a fitful wind was whistling through the girders, our feelings may be imagined. Led by one of the forty-five brow Scot painters, who spoke just the dialect we wanted for the film, the ascent began. Far down below, a white puff of smoke told of an express train about to cross the shining rails on the floor of the bridge. As the train reached the end of the girders, the whole fabric began to rumble. I shall remember as long as I live the swaying of the girders when the first train thundered across below, and my numbed fingers as we set up in preparation for "shooting" the next train to come across. Incidentally, the forty-five painters are so much at home on the bridge that they run up the girders and climb the ladders as though they were merely walking along a street. It is also interesting to note that it takes these men



three years to cover the whole of the 135 acres of steelwork surface with eighteen tons of mixed paint. After my descent, by way of the girderwork and a swinging cradle, I looked up and shuddered. But there was another thrill in store for me before we had finished. Two trains going in opposite directions dashed across the bridge at the same time as I stood ready to shoot one of them with my camera from close quarters. But the second train somehow or other crept up on me when I wasn't expecting it, passed me, its heavy, rapidly moving pistons and rods, smothered in steam, dancing before my eyes, just a couple of inches from my overcoat. That was the nearest I have ever been to death, and the nearest I care to be to an engine making forty miles an hour.

### SMALL OIL BURNER PROVIDES A HANDY HEATING UNIT

Small enough to be used with a kitchen range or hot-water tank, but capable of supplying sufficient heat to warm a five or six-room house, a miniature oil burner offers a large amount of heat energy in concentrated form. It is capable of burning two gallons of oil an hour in heating a home, or of consuming only half a gallon an hour in operating a small range or water heater. It is a small form of a large oil burner, having only one moving part in the burner proper, the hollow shaft on which are mounted the atomizing cup, fan and rotor of the motor. This assembly rotates as a unit on two oversize bearings. The fuel feed is contained within the shaft, permitting the application of oil to the heart of the atomizing cup without



Small Oil Burner Which Can Be Connected to a Kitchen Range or to Furnace to Heat a Home

extra mechanism. The burner can be used in a number of heating operations in shops and factories as well as in the home.

*The Ray Oil Burner Co.  
12423 3rd  
Los Angeles, Calif.*

### RADIO GUIDES NAVY AIRPLANES BACK TO CARRIER SHIP



Small Radio Set Which Will Guide a Navy Plane Back to Carrier Ship, and the Pilot's Indicator

Danger of the navy's fighting pursuit planes being lost at sea when on long trips away from the airplane carrier ship, a hazard which nearly resulted in the loss of two squadrons during the recent Pacific maneuvers, may be greatly lessened by the recent development of a radio homing system to guide the planes back to their floating base. The invisible guiding hand is similar in general to one for passenger air liners, except that it is simpler and more compact. It weighs only eighteen pounds and consists of a receiving set and a straight aerial that can be built into the leading edge of a fighting plane, or strung along the wing. Other parts of the equipment are a combined radio compass and receiver, a tuning-in unit and indicating unit. With this apparatus, a lost pilot needs only to tune in a designated short-wave broadcast from the airplane carrier or ground base and watch the single needle indicator. If he veers, the needle shows how much he is off. Tests indicated the equipment might have a range of 1,000 miles. It is also possible to select a schedule of short-wave changes so that an enemy would find it virtually impossible to pick up the signals.

*by Bernhard Fisher.  
Consulting radio engineer.*

*Copyrighted material  
J. E. Thackerell  
35-4 S. Spring  
Los Angeles  
Calif.  
Western Air  
Express 17 W. 9th St.  
Los Angeles, Calif.*



3/5/51

Long Beach  
Calif



Pontiac Motor Co.  
40 W. Lawrence  
Pontiac Mich



## AFTER TWENTY THOUSAND LEAGUES UNDER SEA



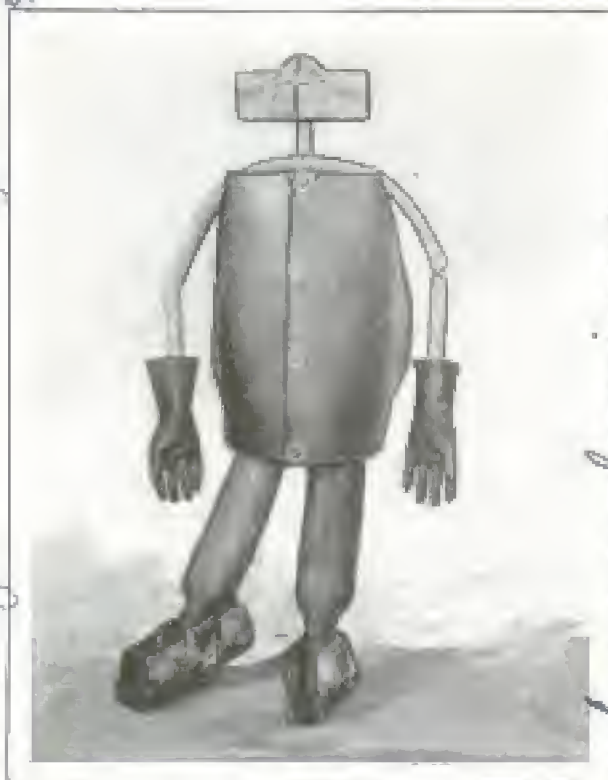
Some of the Submarines Which Recently Arrived at Philadelphia Navy Yard after a Journey from the Hawaiian Islands Where They Had Been Stationed; They Are Awaiting Their Turn to Be Decommissioned in Accordance with the London Naval Treaty



Using Acetylene Torch to Cut the Steel Plates of One of the Decommissioned Subs; the Metal Will Be Sold as Scrap Iron; at Right, Cutting Away the Control Room of an Undersea Craft Which Has Outlived Its Usefulness and Is Now Being Dismantled and Consigned to the Junk Heap







Rubber-Insulated Suit Worn by Power-Company Employees Working on High-Voltage Circuits

### INSULATED RUBBER SUIT USED BY ELECTRICAL WORKERS

Employees of power companies working about dangerous electrical equipment are provided with many rubber safety devices including insulated suits. If the slightest break occurs, the equipment is rendered useless, so it is inspected and tested every three months. Each suit is subjected to a discharge of 4,000 volts and is discarded if any defect is found, as vulcanizing or mending is never attempted. The use of such equipment and the regular testing has almost eliminated fatalities.

### WRENCH WITH VISELIKE GRIP WORKS LIKE PLIERS

Nuts that are hard to reach or to turn yield readily to a wrench that has a vise-like grip like a pair of pliers. It is adjustable like an ordinary monkey wrench but has two handles which, when closed, actuate a toggle joint forcing the jaws together. It slips loosely on or off a nut, but is tight in use when the



handles are closed. It can be used like parallel-jaw pliers, but can be set to open much wider.

### TYPE SET BY PHOTOGRAPHY

Setting type by photography promises to invade the printing industry in a few years. Three typesetting machines using this principle have recently been demonstrated, one invented by a Hungarian and the other two by Americans. Instead of metal molds or matrices into which the metal is poured to form the type, the photographic typesetter has images of the letters of the alphabet which are photographed on a film or other sensitized surface when the proper key is struck. From such photographs, any kind of printing plate can be made.

### ELECTRIC TIME STAMP PRINTS DATE AUTOMATICALLY

Entirely automatic in operation, an electric time recorder prints the time and date of receipt of letters, orders and other office papers without any physical effort on the part of the operator except inserting the papers in the machine. When a paper is inserted in the printing space, the top edge closes a contact which causes

the stamp to operate. There is nothing to strike, pull or push and the speed of the machine is limited only by the ability of the operator. Since only one hand is used to feed the machine, sorting and

stamping can proceed simultaneously. The standard time line recorder indicates year, month, day, a.m. or p.m., hour and minute, but other information can also be included on the stamp along with serial numbers if desired. An electric clock is part of the mechanism, and the recorder is ready for operation when plugged into any light socket. No hand winding is required for the timing part, once it is placed in operation. The apparatus is light in weight and easily portable.



Woodworth Specialties  
Co. Binghamton, N.Y.

Marchant Calculating  
Co. Emeryville, Oakland, Calif.



Com. H. L. Kauffman,

A-756

1445

POPULAR MECHANICS

961

Denver, Colo

## SILVER HAS MANY INDUSTRIAL USES

A-782

While most persons think of silver as a metal used principally for coinage and electroplating, these two fields do not account for the absorption of the world's annual production of about 250,000,000 ounces. Silver is widely used in the chemical industry, particularly for vats in making acetic acid. The precious metal likewise is employed for stills, condensers, taps and cocks in the chemical plant and is used in the milk, cider and jam industries and in making artificial silk. In the food industries it has been found to be insoluble and hence is innocuous physiologically.

## FIREPLACE OUTSIDE OF HOUSE GIVES HEAT FOR VERANDA

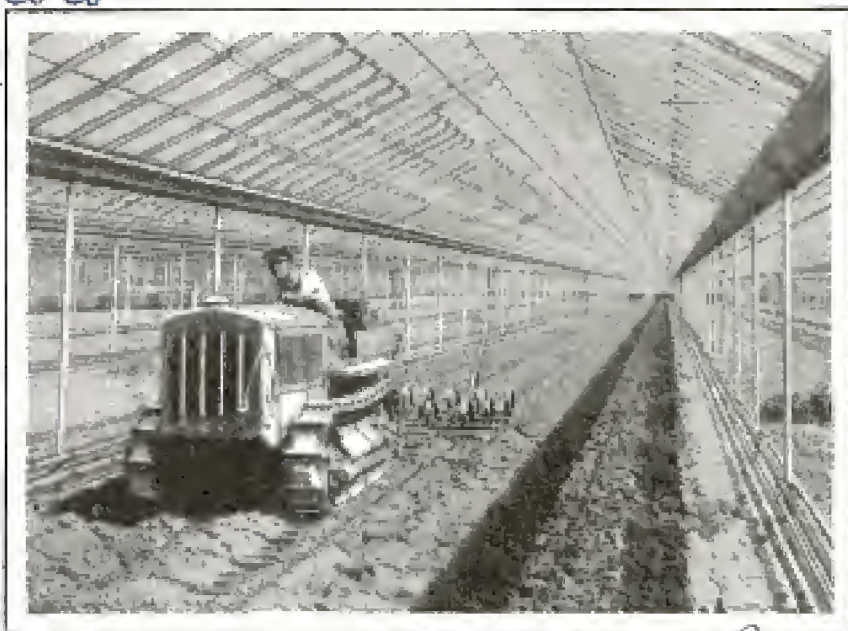
One Kentucky home owner has reversed the usual procedure by building the fireplace on the outside of his house. The old-fashioned fireplace in its new-fashioned setting appears in an outer wall, affording heat for an open portico during early spring and late autumn. Inside is a modern heating plant.

A-734



Residence with Open Fireplace in an Outer Wall; It Warms a Veranda on Cool Evenings

Com. Roy Tschernor  
215  
Cincinnati, Ohio



View of an Ohio Farm, Entirely Inclosed in Glass, Which Grows Crops the Year Round, a Tractor Doing Most of the Work

## FARM UNDER HUGE GLASS ROOF RAISES CROPS IN WINTER

Inclosed entirely in glass, an Ohio farm like a huge greenhouse raises crops the year round. Glass walls and a glass roof protect the plants in winter. From October to May, four crops of leaf lettuce, about 720,000 heads, are grown, and from May 20 to October 1 the glass farm produces about half a million cucumbers. A tractor handles all the work of hauling and preparing the ground. Horses were formerly used, but it was found that the heat slowed them down.

## INSECTS KILLED BY LIVE STEAM SPRAYED ON TREES

As an apparently effective means of protecting orchards from the codling moth, tree scale and other insect pests, a Washington state farmer is using a live-steam spray. Generated in a portable boiler at a pressure of about 100 pounds, the steam is projected from a nozzle of special construction with three divergent outlet tips. Sprayed directly onto trunks and branches of infested trees, both heat and pressure combine with a high degree of efficiency in destroying and dislodging scale and moth larvæ. No chemicals are used in the boiler and a great number of trees can be treated in a day by a single worker.

Com. L. J. Dutton  
Route 1  
Yakima, Wash

Miller Farm and  
Greenhouse Co. Toledo, Ohio

Calif

Interfuller Tractor Co.  
San Leandro

A-776



Mr. Morris S. Viteles  
 Dept. of Psychology  
 University of Pennsylvania  
 Philadelphia



Examiner Testing Power-Station Operator Whose Reactions to Signals Are Recorded on Charts before the Instructor

## MEN TESTED LIKE MACHINERY IN BIG POWER PLANTS

Mechanical safeguards against the interruption of electrical power have been provided by public-utility companies until materials are less likely to err than the men who operate them. Since an interruption in service often may prove costly, power plants now are testing their substation operators much as they do their machines, to be sure that the men are fitted to handle the equipment with which they are entrusted. One such test employs a panel before which the person undergoing examination is seated. Various switches are provided on this board, and the examiner observes the reactions of the man to extraordinary conditions.

## MOVIE THEATER IN MINE PREVENTS ACCIDENTS

Five hundred feet below the surface of the earth, at Bonne Terre, Mo., is an underground movie theater hewn out of rocks, the lobby being the entrance to a shaft of a lead mine. The audience is composed entirely of miners who, upon entering the amphitheater, first see a brilliantly illuminated screen on the "stage."

Pertinent safety messages are thrown on this screen, an automatic timing device changing the warnings to the miners as they pass. Occasionally, instead of accident-prevention news, a moving-picture health film is shown. The subterranean theater has helped reduce the number of accidents, for during 1929 the mine operated without a single fatal accident among its 3,000 employees.

## BASEMENT GOLF COURSE HAS HINGED HAZARDS

One Massachusetts man has utilized his basement for a miniature golf course, the cellar layout offering eighteen holes in a space ordinarily required for one hole. All obstacles and hazards, except sand traps and a mound, are on hinges or are removable. The mound has three pipes at the top, the two outer ones leading to sand traps and the center one allowing the ball to roll free. From the tee to the cup there is a playing surface of forty-five feet for each hole. Odd numbered holes are played through the mound, and the even ones over it. Obstacles and hazards are numbered, each hole calling for a different combination of hazards. Par for the course has been set at 200 and two players require an hour or more for eighteen holes. Electric lights provide illumination when needed.



Miniature Golf Course in a Basement Which Provides Eighteen Holes of Play by Combining the Various Hazards



A-66.4 Cont. Mrs Annie Hyer  
 nunn. 703 Jackson St  
 Amarillo, Texas

POPULAR MECHANICS

963

# ELEVATOR TO REACH UNDERWORLD WONDERLAND



Drawing of Elevator Being Constructed to Descend into Carlsbad Cavern; the Shaft Will Rise 750 Feet, Making It the Longest Single Lift in the World

Carlsbad cavern in New Mexico, the greatest natural wonder of its kind in the world, is soon to have an elevator that offers engineering and mechanical features as startling as those of nature displayed in the cavern. This giant lift is the only cavern elevator and will be the longest single lift in the world, rising 753 feet. While the enterprise will make elevator service available in inspecting a natural wonder millions of years old, the elevator will not be used to transport the average tourist, but only those who might otherwise be unable to make the long trip, including seven miles of trails in the caves themselves. The shaft for this lift is being sunk from above and drilled upward from the cavern floor simultaneously. Due to the porous condition of the earth above the cavern, blasting and drilling operations offer many problems, since the drills frequently plunge into pockets. The completed elevator will cost \$100,000, of

which \$60,000 represents the cost of the shaft. The reason for working both ways on the shaft is that it was found less expensive to drill up than down because the waste from the rise virtually takes care of itself, and about 140 tons of broken rock are removed from the shafts daily. In the rise, the rock is allowed to accumulate, only sufficient being removed to leave working space between the top of the pile and the unbroken ceiling.

## FLAX YIELDS VALUABLE WAX

Study of flax has revealed that it contains a valuable wax in addition to linen and linseed. The wax is nearest in character to beeswax, but has a higher melting point and is harder. For these reasons, it gives a very high polish, more durable than that given by carnauba, the tropical palm wax most used in high-grade polishes.

Mr. W. H. Gibson reports  
 to distribution of

Albrey House Westminster S.W.1. Eng.  
 London, S.W.1. Eng.  
 Q-75  
 Chemical Engineering

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*Wm. L. Kilcarr,  
London Trade Commission  
superior to all  
of Europe*

dust, and only a fine slag, with no fuel value, is left. Gases pass below the boiler and into a superheater, then travel through a water-tube flue and finally are used in an air heater to warm the air that is entering.

### ONE-DAY COLLAR SOUGHT BY COTTON MAKERS

British cotton manufacturers now are working on the problem of producing a stiff cotton collar for men so cheap that it may be discarded after having been worn once. In an effort to find other new uses for cotton, tests are being made in employing much of it in shoemaking, strengthening the box toe with heavy cotton cloth and using laminated layers of cotton in the heel.



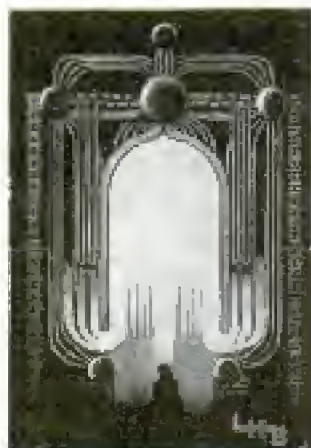
*© Keystone View Co.*  
Traffic Light for Airplanes: This Searchlight with Twenty Bulbs Guides Pilots to Proper Position on Landing Field

### TRAFFIC LIGHT FOR AIRPLANES GUIDES PILOTS IN LANDING

Pilots approaching one German airport are governed by an air policeman who directs the planes much as a traffic officer controls automobiles. The air officer manipulates a huge searchlight containing twenty powerful bulbs, which serve at night not only to direct the course of the pilots approaching the landing field, but also to show them where the officer wants them to land.

### COAL-DUST HEATER FOR BOILER OPERATES LIKE FOUNTAIN

As a means of economical boiler heating by radiation, a European firm has developed a system which utilizes a fountain of coal dust for fuel. The burners are arranged vertically so that the dust, mixed with hot air, is blown fountainlike into the firebox above them. The firebox is so shaped that the flame is turned back on itself and is surrounded on all sides by the space to be heated, so that no energy is wasted.



The flame, traveling once up and once down before reaching the heating surface, consumes all the

### TIRE GAUGE WITH PENCIL CLIP FITS IN VEST POCKET

Clipping onto the vest pocket like a pencil, a slender tire gauge is now available which is shock-proof so as not to suffer injury if dropped. The triangle indicator can be read without removing it from the tire and, as an added convenience, it contains a valve-deflatter on the back.



### MOVIES YIELD SILVER FORTUNE BY RECLAIMING PROCESS

Chemists now are "mining" an annual fortune in silver in the moving-picture studios. Their mines are the fixing baths used in developing films. Silver salts are employed extensively in the preparation of films which are sensitized with a solution of nitrate of silver. A chemical change takes place when the film is exposed to light which converts the salts to metallic silver. Formerly this silver was considered waste, but today it is being recovered. Each 5,000 feet of film developed yields about four ounces of silver

*see material form letter  
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*Linke-Hofmann  
Bresch Werke G.m.b.H.*

*Acme Air Machine Co  
254 East  
Bronx, N.Y.*

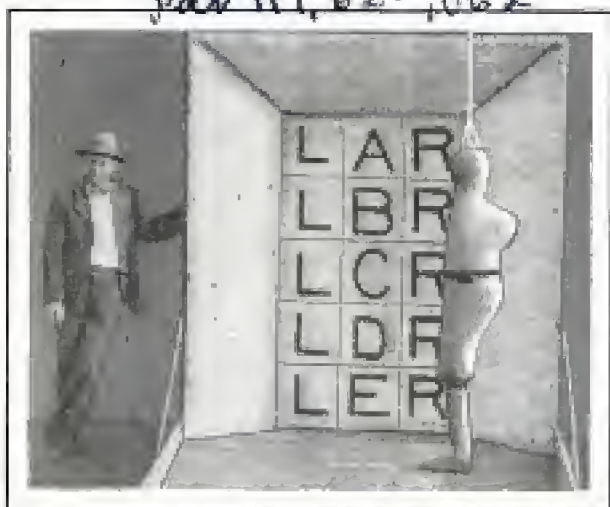


Cont. Travel Don Benin  
 Clemons Jr. 286  
 Kinnard  
 Layton Ohio A. 742

which is dissolved in the fixing bath. These baths fill huge tanks and must be renewed frequently. Heretofore, the tanks were emptied into the sewer. Today they are drained into precipitation vats where a chemical treatment reclaims the metal. Each 60,000 gallons of waste yields one ton of solid silver.

### PITCHER'S TARGET INDICATES HIS ACCURACY

Baseball pitchers can be tested for accuracy with a target arrangement which also contains a provision for testing the velocity of the thrown ball. The target contains fifteen lettered squares with a "C" indicating the center or bull's-eye and other letters showing in squares to left, right, above or below the center square. A dummy batter can be shifted to right or left of the target, for practice in pitching to a right or left-handed batter. The scorer watches where each ball hits after instructing the pitcher at which square to aim, and score cards are provided to check the percentage of accuracy.



Target for Baseball Pitcher Which Measures Accuracy; Note Dummy Batter at the Plate



Swivel Boom for Racing Yachts and a Model Showing It in Use; the Unusual Shape Helps Hold Sail in Most Effective Position

### SWIVEL BOOM ON RACING BOAT MAKES SAIL EFFICIENT

To hold the sail in its most effective shape, a swivel boom for racing yachts that is a radical departure in rigging construction has been made and will be used this year on I-class eighteen-foot boats. The swivel boom is a thin flat board, reinforced along the edges with heavier strips of wood. Its cellular construction gives lightness, stiffness and strength. One edge is straight, the other curved to the shape believed most effective for the sail to take. The spar attaches to the mast by a swivel set at the forward end of the straight side and the foot of the sail is held to the track along the curved side. The theory is that when the sail is set, the boom holds it in the best shape, while the wide surface keeps the wind from escaping off the foot of the sail.

Hero of Alexandria experimented with the idea of a steam engine about 150 B.C.

Ray Oregon and Long Oregon India

drw. J. J. Stauffer  
 Intwiler Miss



a. 436 Carl. Leon Blaseman.  
55 W. 86 St. New York

# On the Air

## with the



WHAT'S ON THE AIR?—The "Traffic Board" Showing Every Program Presented; the Name Is at the Top and underneath It Are the Stations Taking It and the Time

"HELLO—on the roof! Give us the whistle. Turn it up full. Now fade it. Passenger bell's coming through too loud for the whistle tonight. Are we all set? Stand by everybody! Fifteen seconds. Watch for the light! All right, here we go!"

You are peering from a little booth through three panes of plate glass into the largest broadcasting studio in the world. A director is shouting, the orchestra is tuning up and there is a clatter of tin plates and snaredrum, but not a sound penetrates the monitor room where the program director, studio engineer and advisory director are seated at a long table overlooking the scene.

Each man has a script, or complete story, of the radio drama in his hands, as a large clock, whose one hand jumps

forward one-fourth inch at a time, clicks off the last few seconds before the program is sent out over 33,400 miles of wire to twenty-seven radio stations in all parts of the country and then flashed through the air to millions of listeners at a cost of about \$200 a minute.

All told, nearly three hundred persons take part in such a broadcast. First the play is written and checked for absolute accuracy. Then "sound effects" and a musical theme are carefully woven into it. There follows sometimes as much as thirty hours' rehearsal of the musical conductor, twenty-three musicians, fifteen actors, five sound-effects experts and the two directors. In addition there are eighty-one engineers at the various broadcast stations, and twenty-seven an-

nouncers, or one for each station, and also eighty-one engineers at the repeater stations of the telephone company to see that there is no break in the wires over which the program is flowing.

In the silent control room, the program director, Don Bernard, turns a switch, and suddenly the sounds of the studio come into the room through a loud speaker in one corner. Before him is a microphone through which he can talk to the people in the studio and the invisible sound-effects men on the roof outside. At Bernard's right sits Ralph Davis, the studio engineer, or "gain rider," before what looks like a small radio set—the all important mixing panel.

Five microphones from the roof and various parts of the studios of the National Broadcasting company, in Chicago,



# "Empire Builder"

are connected directly to this mixing panel. There are five knobs, or controls, on the front, and by turning them, the sounds from any of the mikes are raised or lowered, just as you control the volume of your set, so that the various effects will blend together into a perfect program for the listener.

The third man in the monitor room is Harold M. Sims, assistant to the president of the Great Northern railway and advisory director of the program. He slips



In the Control-Room Booth—the Advisory Director Beating Time for Sound Effects, and the Studio Engineer, or "Gain Rider," at the Mixing Panel That Controls the Volume of Sound from Five Microphones



"Naught but Ice, Master Hudson," Comes a Voice, and You Hear Grinding Berge, Screaming Wind and the Booming of the Ship—Sound Effects Cunningly Woven into the Play

into his seat in the booth as the opening strains of the orchestra fade away and begins to count the seconds by waving his arm in time with the second clock. Now follows a realistic radio reproduction of a moving train. It lasts just forty seconds, but it took months to prepare.

"Last few bars of music!" says the director, interrupting the orchestra leader by talking through his microphone as the dress rehearsal gets under way. The musician raises his violin bow and starts the orchestra off again. The engineer turns a dial. The announcer starts off with his introduction.

"Too late," says the engineer; "off by two seconds." The announcer repeats. The orchestra fades to a whisper.

The scene opens in a railroad telegraph office. The staccato clicks are not faked. A real railroad telegraph operator sends a real message which any Morse operator can understand. At this point the script directions read:

"Door opens. Wind up. Closes. Wind down. Stamping of feet."

A stage hand opens a real door, and on the instant an airplane propeller is started by a motor, and throws off the whistling "whooo-ooo" of the blowing wind. Then one hears the slam of the door. Instantly the propeller stops. The stage hand who opened the door stamps his feet on a mat to simulate a man just coming in.

Then the actors pick up the dialogue.

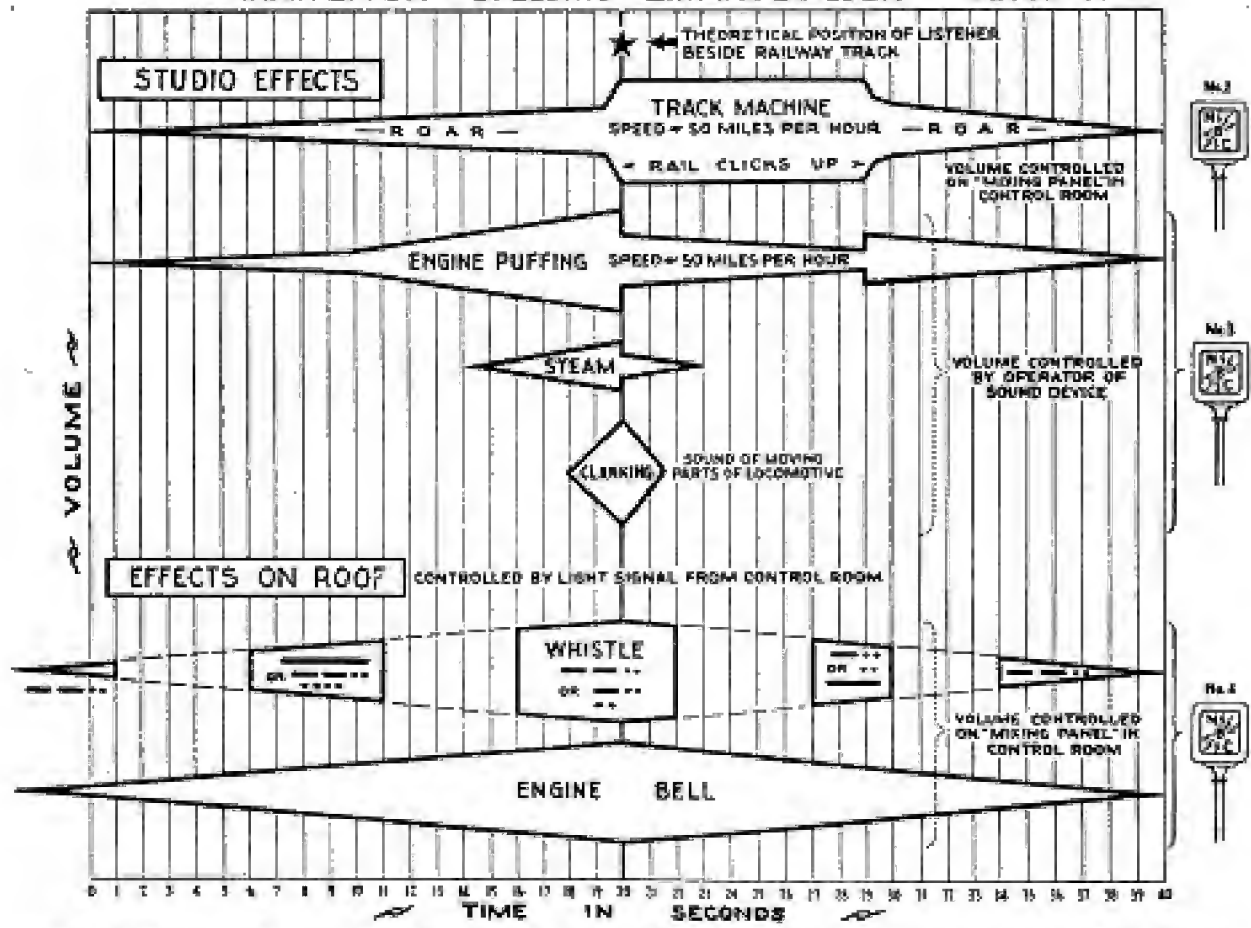




Behind the Scenes at a Broadcast. Showing the Three Directors in the Silent Control Room with Its Glass Windows Overlooking the Orchestra and Sound Effects in the World's Largest Studio, and the Engine Bell and Whistle on the Roof Outside the Station Which Are Controlled by Light Signals



TRAIN EFFECT • SPEEDING "EMPIRE BUILDER" • CLOSE UP



Timed to the Split Second, This Is How the Sound Effects You Hear from Your Loud Speaker Are So Cleverly Woven into the Radio Drama

Frequently the director interrupts with a suggestion, such as, "Blow your engine whistle on the word 'run' as we fade back," or, telephoning the men on the roof, "We're going to do a passing train effect on page 2. Two flashes of light mean bell. One light, whistle."

"O.K." answer the outside sound men.

For the train sound effects a "track machine" was built to absolute scale, on which a speeding miniature train brings the listener the clickety-clack of a trans-continental train as it pounds its way through the night. Combined with the boom of the kettledrums, the shriek of a whistle, the clang of bells, the hiss of steam, the synthetic harmony produced by these mechanical devices gives a startling reproduction of an actual train. The total effect lasts forty seconds, and to have the train's approach and disappearance in proper balance, experts calculated by seconds what the dominant sounds should be.

In the first second, the sound man on the roof sees his white signal light flash.

He pulls his cord and throws the steam into the great whistle, which has been taken from one of the Great Northern's monster locomotives. It begins with two long and two short toots. It gives one long toot from the sixth to the ninth second, and one long and two short toots from the sixteenth to twentieth second. Then, as its volume fades, it gives a series of regulation crossing-signal whistles. Outside sound effects are picked up by a third microphone. In order to be certain that all the motley sounds die off at once, the volume in the last ten seconds is faded out by the engineer at the mixing panel. Mr. Sims, who is largely responsible for this excellent effect, conducted many experiments before he finally succeeded in adapting it to the studio.

"There is probably as much difference between the sounds of different trains as there is difference between flakes of snow," he said. "I have used a stop watch on fifty or sixty trains, actually timing the various units of the medley. Trains sound different in hilly country from what



they sound in flat country. Even when you repeat the experiment at one point, there is a wide variation in every train, depending upon the atmosphere, the time of day, whether the train is going upgrade or down, whether it is picking up speed or slowing down, the length and weight of the train, its speed, power of the engine, and many other factors.

"Again, the time it takes a distant train to come up and pass one and disappear into the distance varies from three to five minutes. Limitations of the radio do not permit us nearly so much time, to say nothing of the fact that it would be tedious to listeners to wait that long.

"What I really had to do was to build up a synthetic effect that would make the sound even more colorful than the real. We bring the train up from a distance at a much greater speed than it actually comes up, and then we fade it out again even more rapidly. We have worked out charts on arriving trains, departing trains, freight trains, trains passing each other; train interior effects; passenger flyers passing strings of box cars, grade crossings with a warning bell, and clicking switches."

All broadcasting noises practically, must be made to order in the studio. A most critical audience, often numbering millions of people, lends careful ears to the synthetic sounds. The action of a radio play is as broad as that in a theater, and

the faithfulness of the illusion depends largely upon synthetic sounds.

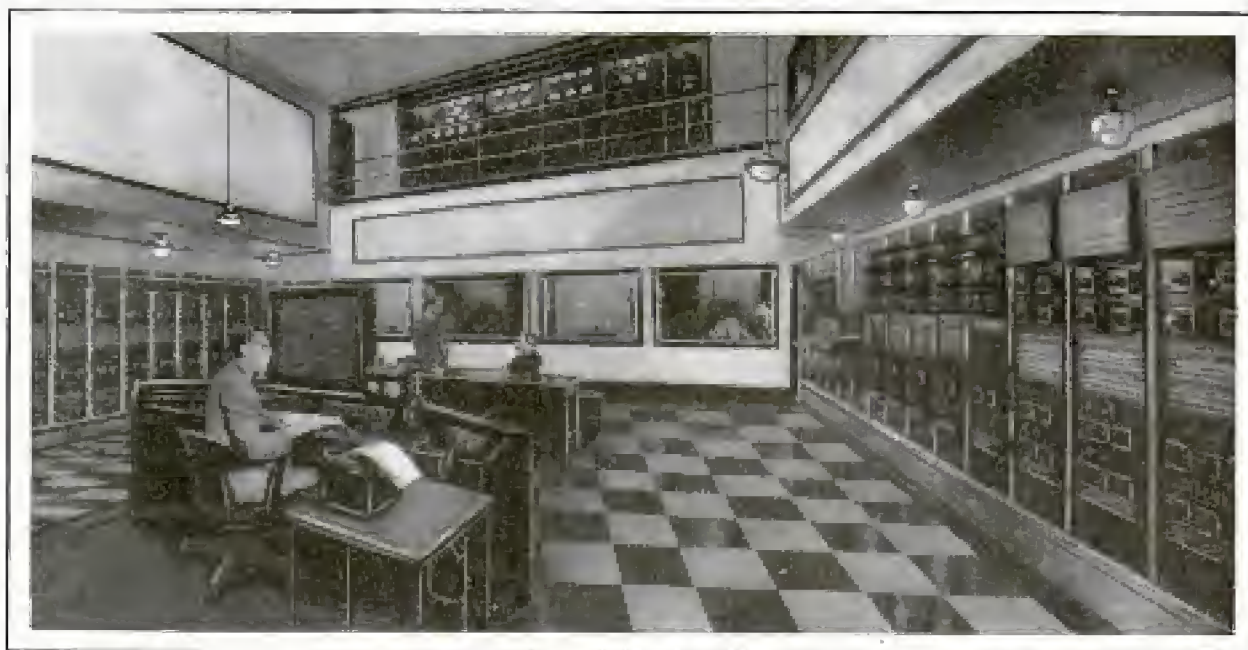
An airplane engine, if picked up outdoors, would be heard for what it is. Inside a studio, the reverberations and echoes, clashing against the walls, would give the radio listener nothing but noise. But an old-fashioned foot-pump organ makes a noise exactly like an airplane motor.

The "zz-z-zzii--nun-nngg-g-gg" of a bullet is simulated by plucking the steel string of a guitar. Hoof beats are hard to fake. "Sometimes," said the production manager, "they sound terrible. I almost considered bringing a horse into the studio and riding him myself, but he couldn't pass through the corridors."

Fire is simulated by cracking a bundle of canes together. Hissing water is easily imitated by letting off compressed air. If a house collapses, a box of bricks are allowed to fall down a chute. A firecracker celebration on the roof gives the radio listener an idea that a battle is taking place. Machine guns are simulated by riveting machines.

"All right, here we go! Stand by, everybody! Quiet, please!" comes the voice of the director, and as the second hand points to 9:30 o'clock you lean comfortably back in your chair while the loud speaker begins:

"The Great Northern railway presents 'Empire Builder,' and another radio drama is launched on the air.



"Nerve Center" of the United States, the Main Control Room of the National Broadcast Studios in Chicago, from Which 33,400 Miles of Wire Spread the Programs to All Parts of the Country



## FLYING VIEWS ON SCREEN AID STUDENT AVIATORS

Flight instruction for student aviators now is being given by a robot which takes the place of both the human instructor and the airplane, and enables the student to learn the principles of flight without even leaving the ground. The robot instructor operates automatically under electrical and pneumatic power. The student sits facing a standard set of controls and a full-sized instrument board containing blind-flying and motor instruments. He opens the throttle for a take-off and on a screen in front of him flashes the picture of a horizon with the silhouette of the plane's engine and the wing struts in the foreground, a duplicate of an actual scene, with a miniature propeller whirling its blades through the field of vision. Manipulation of the controls causes the horizon to shift exactly as though the ship were in the air. The horizon drops if the student pulls the stick back to climb, and moves toward the top of the screen in a dive. It tips to right or left as the controls are moved for a turn or bank, while opening and closing of the throttle causes the indicator to register the speed, giving warning of stalling or too fast a dive.



Student with Plane Controls Synchronized with Views on Screen to Give Sensation of Flying

### ICE-CREAM LIFT IN THE CAN MAKES IT EASY TO DIP UP

Easy access to the contents of a half-empty ice-cream can is provided by equipping it with a lift frame fitting the lower half of the container. The metal frame with its solid bottom is placed in the can prior to freezing



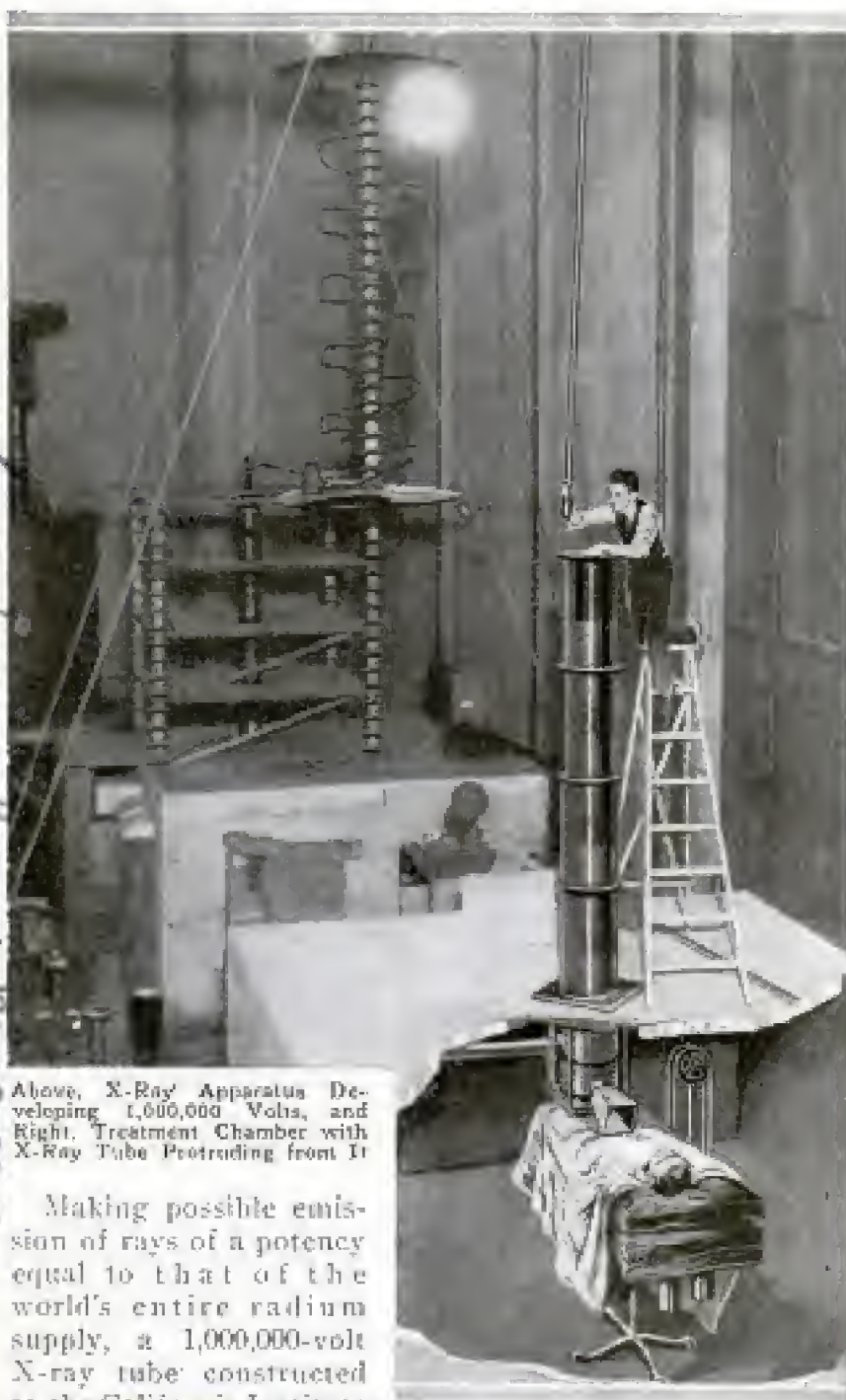
the cream. When the can is partly empty, two buttons in the top of the cage are exposed, and a jack lift is then placed on the edge of the can and attached to the buttons. The jack is operated to raise the cage to the top of the can, thus making the bottom half of the cream as easily accessible as the upper part. Spring catches on the cage snap over the edge of the can to hold the frame in place when the jack is removed.

☛Telephone cables now are being made whose individual wires are as fine as a hair, 1,800 pairs of twisted copper strands being contained in a section.

H. B. Werner  
Terre Haute, Ind.



# GIANT X-RAY TUBE IS TESTED IN TREATING DISEASE



Above, X-Ray Apparatus Developing 1,000,000 Volts, and Right, Treatment Chamber with X-Ray Tube Protruding from It

Making possible emission of rays of a potency equal to that of the world's entire radium supply, a 1,000,000-volt X-ray tube constructed at the California Institute of Technology recently was tested by submitting patients to its radiation. Rays of sufficient intensity to penetrate to a tumor in any part of the body are reported to have been produced with the tube, which is intended for research work in combating cancer and other diseases. The apparatus is contained in a fourteen-foot treatment chamber, through the roof of which the end of the giant thirteen-foot tube protrudes. Patients recline on a leather couch which is raised and low-

ered by weights to the desired distance from an aperture through which the rays escape. The tube will operate continuously at 600,000 volts, whereas the previous highest intensity used in treating human beings has been less than 250,000 volts. The world's radium supply is rated at \$12,000,000, so the tube which approximates the energy of all the radium available might be said to be worth that figure although it cost only a few thousand dollars.

## DOUGH MIXER CAN SUPPLY BIG CITY WITH BREAD

Enough bread to supply a large city for a day can be mixed by one machine capable of stirring the dough for 50,000 loaves of bread an hour. The making of bread now is an exact science, laboratory-controlled, and R. M. Temple, who developed the breadmaking machine, recently was honored for the work when a medal for outstanding engineering achievement was bestowed on him. In the modern bakery flour and

water are introduced from automatic weighing devices, while yeast, milk and other ingredients are mixed in a laboratory and added from carefully measured containers. Each lot of flour is tested to determine the degree of mixing and the amount of water necessary, after which the mixing machine is set and at the specified time pours out its batch of dough, the workman merely pressing a button to start the machine, the rest of the operation being automatic.

*Donald M. Temple  
Bakery, Inc. - Portland, Ore.  
and Phila.*

*Designed by Prof. C.C. Lawrence  
and his assistants of Physics*

*A-788*



## LEATHER COVERING FOR FLOOR IS LIKE TILED GLASS *a. 745*

Millions of surplus hides in storage may be released soon for use in a leather floor covering that has recently undergone satisfactory tests. The covering is cut into squares, a quarter of an inch thick, and cemented to the floor base, producing a tiled-glass parquet effect, and may be glossed and colored as shoes are now. The covering has great resiliency and is not expensive to produce.

## EGGS IN STORAGE KEPT FRESH BY DIPPING IN OIL *a. 777*

Recent investigations by the department of agriculture have led to the discovery that fresh eggs dipped in oil and subjected to carbon-dioxide gas in a vacuum will retain practically all of their moisture and carbon dioxide. The eggs first are dipped in mineral oil, without color, odor or taste, in a chamber virtually airtight. A partial vacuum is created by pumping air from the chamber which also removes some of the air from the eggs. These are then surrounded by gases under normal pressure, causing some of the oil to be forced into their pores, and thus completely sealing the eggs. In comparative tests it was found that vacuum-dipped and carbonated eggs lost only one-tenth of one per cent in weight during ten months of storage, as against sixteen by open-dipped eggs, and were as fresh as those two days old.



Examining Eggs Dipped in Oil and Treated with Carbon-Dioxide Gas to Keep Them Fresh



Loud Speakers Mounted on Extension Platform on Auto to Make a Portable Public Address System

## LOUD SPEAKERS ON TOP OF CAR FOR OUTDOOR MEETINGS

To make public-address amplifying devices available for all outdoor meetings in his community, a Colorado radio dealer has equipped his automobile with four loud-speaker horns mounted on an extension platform over the top of the car. The whole apparatus, including the batteries, fits into the rear of the car, thus transforming it into a portable amplifying system.

## BABY FISH GROW FAT ON MILK AND ORANGE-JUICE DIET *a. 786*

Baby trout, like human infants, thrive on milk and orange juice. The milk-fed fish are produced by one western hatchery which grows several million trout a year. After emerging from the eggs, the fingerlings do not eat for ten days while absorbing a yolk sac from the egg provided by nature. When they finally do begin to yearn for worldly food, they receive orange juice and milk, mixed in proper proportions and fed with a medicine dropper every few hours. This diet is continued for ten days after which they are ready for more substantial food.

*Built by Fred A. Nichols  
a radio dealer at Eaton, Colo*

*and Shackwell*

*Bureau of Chemistry  
and Soils*

*Rainbow Angling Club  
Azusa, Cal.*



Carl. Walter & Burton

10327 Corda in  
POPULAR MECHANICS

Amos. Blue

974  
a. 667



An Aquaplane Rider Hitched His Craft to a Small Dirigible, and Apparently Found the Latest Means of Towing Filled with Excitement

### AQUAPLANE RIDER IS TOWED BEHIND AIRSHIP

Aquaplane riders who find excitement in hitching to speedboats have a new thrill in prospect if an obliging airship happens to pass by and offer a lift. An aquaplane at Miami, Fla., recently was towed for a considerable distance by the small dirigible "Mayflower," the airship soaring above the water at an even altitude and pulling the water craft by a towline. A similar stunt with a glider also proved successful.

### FISHING ROD AS RADIO ANTENNA FOR TOP OF AUTOMOBILE

Collapsible steel fishing rods are being installed on the tops of automobiles used by the department of commerce in checking the many radio range-beacon stations that keep airplanes on the airlines by furnishing signals. The fish poles have been

found to serve admirably as radio antennae after all the conventional aerials, including screens beneath running boards, wire loops inside the bodies, and loop antennae were found unsatisfactory. Ignition systems of the test cars are shielded so the receiving sets are capable of checking the radio range beacons as accurately from the ground as can planes flying overhead. When the car is operating close to a broadcast station, only one or two sections of a pole are used.

### TINY GAS ENGINE DRIVES FORTY INCH BOAT

Constructed exactly like a heavy-duty marine engine, a tiny gasoline engine, built by a University of Washington student has a three-quarter inch stroke, three-quarter inch bore, one-third cubic inch piston displacement and develops one-sixteenth horsepower. It is a two-cycle power plant, has one cyl-



Tiny Gas Engine Developing One-Sixteenth Horsepower Used to Drive the Forty Inch Boat Shown

Daniel Collins  
senior

Copyrighted material

Swodyear



21662

inder and is air-cooled. The gas tank is filled with an eye dropper and holds a thimbleful of fuel, while the spark plug is about one-half inch long. The engine provides power for a forty-inch boat, driving the craft through the water for a distance of 100 yards at a rate of four miles an hour. Its flywheel makes 1,000 revolutions per minute.

## SOLDER REQUIRING NO HEATING MAKES REPAIRS EASY. 740

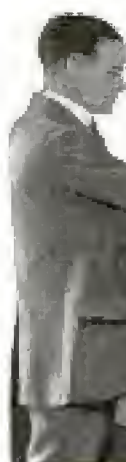
Fluid metallic solder that requires no heating and forms a tight waterproof joint simplifies repair work. It can be used in soldering metals, including aluminum and glass, and can also be employed like glue in joining wood parts or joining metal to wood or metal to glass. It is not affected by heat, except an open flame, after it has hardened.



Examples of Metal, Glass and Wood Joined with a Metallic Solder That Requires No Heating

## COIL SPRINGS ON BRIDGE CABLE ABSORB VIBRATIONS. 760

When lead-covered cables are attached to large steel bridges, some means must be devised to absorb vibration or the lead of the cable will crack and the cable will be ruined. A recent method to overcome the difficulty consists in attaching the cable to the support on the bridge by an ordinary coil spring. The short, quick jerks are absorbed by the spring and only a slow sway which will not damage it, is transmitted to the cable.



Models of Some of the Armored Car Bodies That Are Being Tested by the Army



Topcoat Fitted with a Special Pocket and Flap for Transporting the Pet of the Wearer

## POCKETS FOR CARRYING DOGS IN LATEST TOPCOATS

Pockets for puppies is the latest novelty incorporated in topcoats for those who like to take their small pets about with them. The pockets are designed to accommodate each canine occupant after careful measurements, and a special flap permits Fido to get plenty of air along with a free ride. The idea has even been extended to automobiles which are being equipped with highly decorative baskets for the convenience of dogs and other pets.

## MANY TYPES OF ARMORED CARS BEING TESTED FOR ARMY. 731

Several kinds of lightweight armored cars are now undergoing tests for the army at various posts throughout the country. Models of these vehicles of war show different designs in armor-plating and gun turrets. The cars are crosses between a tank and an auto, have high speed and great maneuverability and are to be employed for scouting work and for support of the cavalry.

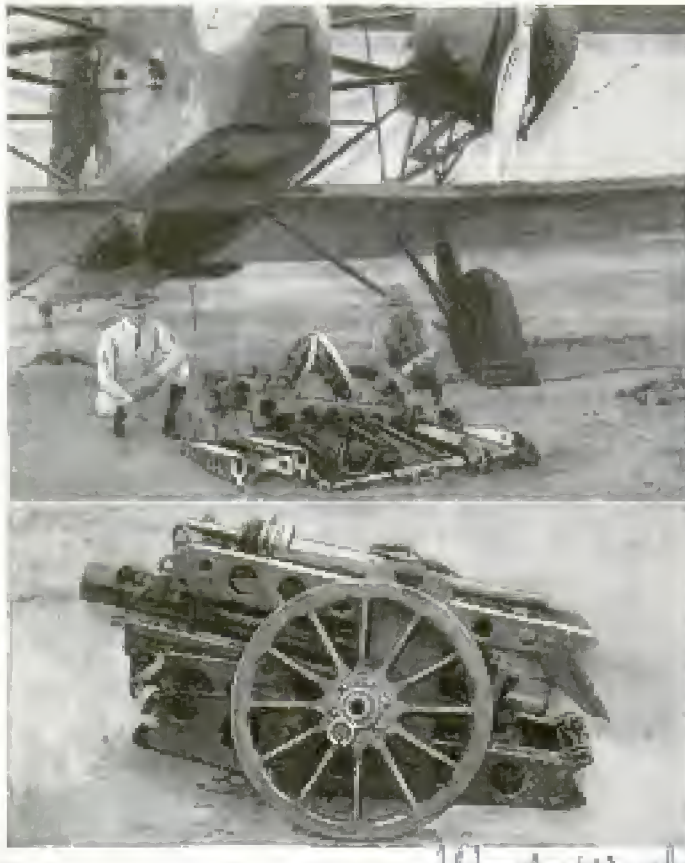
© U. & E.



Conf. Ray Blair  
Signal Officer, Fort Hayes  
Columbus, Ohio



H. Van der Bent  
Leyden Observatory



Above, Howitzer Dismantled, and, Below, Packed Ready to Be Loaded aboard a Bombing Plane for Transportation

### ARTILLERY CARRIED BY PLANE ALONG WITH GUN CREWS

Army airplanes were employed recently in transporting field artillery and gun crews from the Panama Canal to a landing field 150 miles distant. Three howitzers and a battery of the Second Field artillery made the plane trip in a little more than an hour, where, by ordinary means of transportation over existing roads, the journey would have required four or five days. The maneuver demonstrated the possibility of a combination of artillery and aviation in either offensive or defensive warfare. The officers and men were carried in four transport planes and the guns, dismantled and packed, in three twin-motored bombers. Bombers and transports were protected from the attack of a theoretical enemy during the journey by a formation of fourteen pursuit planes flying at an altitude of 12,000 feet above the line of flight.

☐ The "Graf Zeppelin," German dirigible, covered a total of 70,000 miles in 1930.

### MOST RAPIDLY FLASHING STAR IS "ELECTRIC SIGN OF SKY"

Flashing out brightly every 100 minutes, a star that has been dubbed the "electric sign of the sky" has been discovered by a Dutch astronomer at an observatory in South Africa. Many variable stars which regularly change in brightness are known and studied by astronomers, but this one, which is in the southern constellation of Puppis, part of Argo, the ship, changes more rapidly than any other known variable. Usually the period is a matter of days. Because of its faintness, a difficulty arose in measuring the period of the blinking star since an exposure of half an hour was required to photograph it. However, when brightest, it is of the fourteenth magnitude, and can be observed visually with the telescope at Johannesburg. From these observations, the period was determined. The change is about one magnitude, so when brightest

it is about two and one-half times as brilliant as at the minimum of the period of variation.

### SAFETY MATCH LIGHTS ITSELF WHEN IT IS WITHDRAWN

Self-lighting safety matches are now available that are ignited when withdrawn from their paper container. The matches are held, head down, in a case, and scratch two striking surfaces when pulled out.



Self-Lighting Safety Matches That Are Ignited When They Are Withdrawn from Their Container

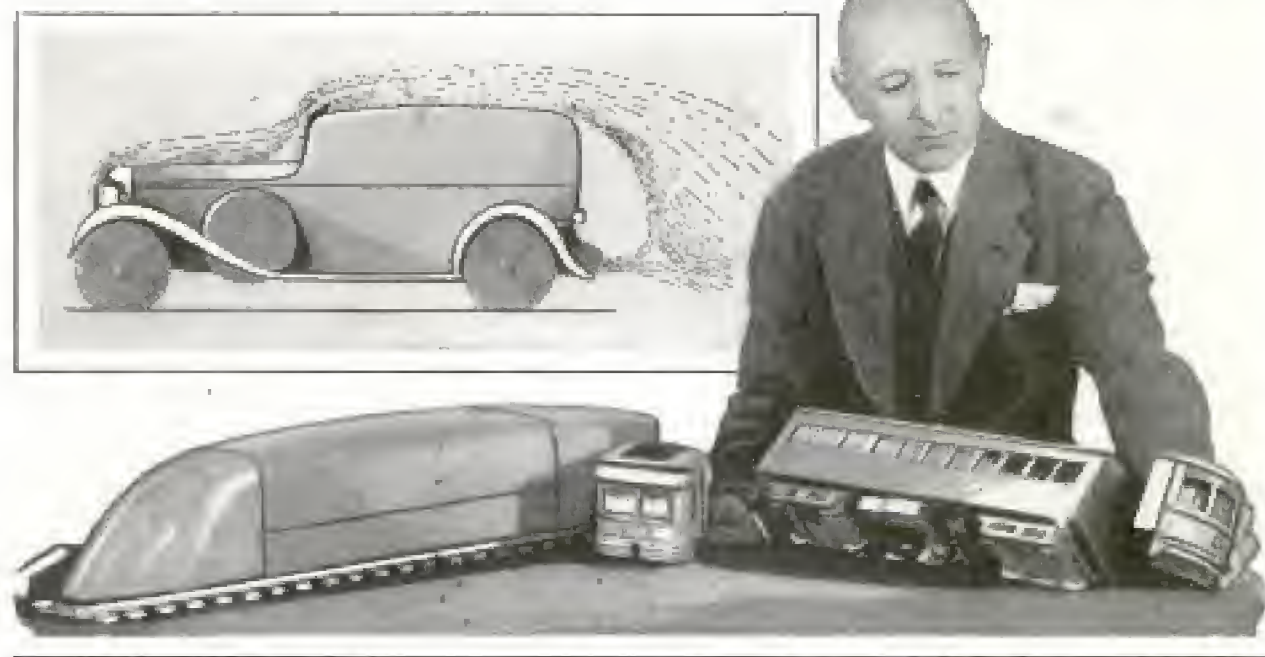
Liamond Match Co.  
Cleveland, Ohio



## DROP OF WATER POINTS WAY TO HIGHER SPEEDS

One drop of falling water is showing engineers how to revolutionize the shape of trains, locomotives, interurban cars and other high-speed vehicles. That drop

could be obtained with less power consumption and better transportation service would then be available for lower cost.



Above, Drawing Showing Air Currents Set Up by Moderate Streamlining of an Auto Body; Below, at Left, Streamlined Shape Designed for Railway Car to Decrease the Wind Resistance

of water helped them to work out the present designs for "Zeppelins," airplane wings and racing automobiles. Now the same principles are being applied to train design, and recent announcements by Dr. Oscar G. Tietjens, of the Westinghouse Electric and Manufacturing company, indicate that the dawn of a new day in locomotive and coach construction is about to break. More than one year ago the work was started by building a wind tunnel for testing models of present-type trains as well as those of streamline pattern. Doctor Tietjens' background of experience in the development of aircraft and racing-car designs, gave him knowledge of the problems to be encountered. He knew that the investigations of wind resistance had revealed the fact that a falling drop of water naturally assumed almost the shape that offered the least resistance to the air through which it was descending. Tests indicated that total air friction could be reduced one-half and wind resistance to one-third for certain types of rail equipment at high speeds. If this could be accomplished, higher speeds

When the present type of light interurban car is moving forty miles an hour, wind resistance is almost fifty per cent of the total resistance. When its speed is increased to eighty miles an hour, the wind resistance has become more than seventy-five per cent of the total train resistance, three times as great as the mechanical friction. In the case of a heavy locomotive and two heavy coaches, streamline design saves thirteen per cent of the required total horsepower for a speed of thirty-five miles an hour and thirty-two per cent of the total horsepower required for a speed of seventy-five miles an hour in present equipment of similar weight, according to the tests. It requires 286 horsepower to drive the present type of light interurban car eighty miles an hour. Tests indicated that the same type of car in the streamline design can be driven eighty miles an hour with only 140 horsepower. From these tests, it is expected to work out new styles in high-speed cars and trains that will be revolutionary in appearance as well as notable for their economy of operation.



A-323  
978

Cont. Miss Margaret  
Amie Armit, 413  
Chamberlain Ave.  
Madison, Wis



Padded Suits and Helmets Worn by Bobsleigh Riders Protect Them in Case of a Bad Spill, but Give the Riders a Grotesque Appearance

## MASKS FOR BOBSLEIGH RIDERS PROTECT FACES

Bobsleigh riders competing for championship honors at Lake Placid, N. Y., turned out in grotesque uniforms made necessary to protect them not only from the cold, but also from falls in case of spills. The Saranac lake team, which won the championship by whizzing over the course in one minute and fifty-two seconds, was not only well padded, but each member wore a combination face mask and helmet for further protection.

## DOOR CLOSER FOR AUTOMOBILE OPERATES AUTOMATICALLY

Adding to comfort, convenience and safety in motoring, an automatic door closer for the automobile shuts the door



to which it is attached as soon as anyone enters or leaves the car. It operates through a specially designed spring and arm and does not cause the door to slam, but to close

at uniform speed with sufficient force to engage the latch. It is adjustable to any tension necessary and is installed at the top of the door.

## CAN RUBBER BE MADE OF CORN STALKS?

So much interest has been aroused over the possibility of producing a form of rubber from corn stalks that the bureau of standards has employed a chemical engineer to work on the project. C. E. Hartford, the man chosen, during recent researches found that if the corn-stalk pulp is put through certain mechanical treatments

and then combined with water, it forms a tough jelly which becomes horny when dried and resembles hard rubber. The product has been named "maizolith," and tests are being made to determine whether it has properties making it suitable for use as a substitute for rubber.

## LOCKER FOR CREAM-CAN COVER PROTECTS CONTENTS

Cream cans and their contents are protected by a locker for the cover which fits crosswise on the top of the can, a half-inch hole in the cover holding the end of the lock in place. The lock



offers more security than the old method of using wire to hold the cover in place, is made of cast steel and holds firmly even though the can is rolled or turned upside down.

Piano manufacturers, recognizing a difference in public taste, now make instruments in several tones.

Inv Joseph Saucher  
c/o Tony Kerpich, Harbetta  
mus

Res. Margaret Rodricks, plus  
516 W. 57 St. N. New York  
Miss Mary A. Brecht, plus  
2729 St. Lawrence Ave.



A. 387 Cont. Barnett Laidlaw  
Essex, 4581 Oakwood  
Chicago

# Ol' Man River Comes Back



**B**IG things are happening on the Mississippi these days. During the last ten years Uncle Sam has appropriated more than \$225,000,000 for reestablishing navigation on that mysterious old river and its navigable tributaries. As a result, the Mississippi—once the highway of commerce which carried the traffic of the entire American midlands, but of late years deserted—has entered upon a new era. A mighty and growing commerce today plows up and down the rivers. Waterways are continually being improved, new port terminals built, and channels to accommodate ever-spreading inland commerce dug.

Thirty months hence, the midwest's century-old dream of connecting the Great Lakes with the Mississippi will have become a reality, for the channel being dug across Illinois is the last link of the Lakes-to-Gulf waterway. Locks and dams, as large as those on the Panama canal—600 feet long and 110 feet wide—provide a nine-foot navigable waterway from Chicago to New Orleans. Two years ago the last of the series of fifty-two locks and dams was completed on the Ohio section of the Mississippi system, which gives that stream a year-round navigable

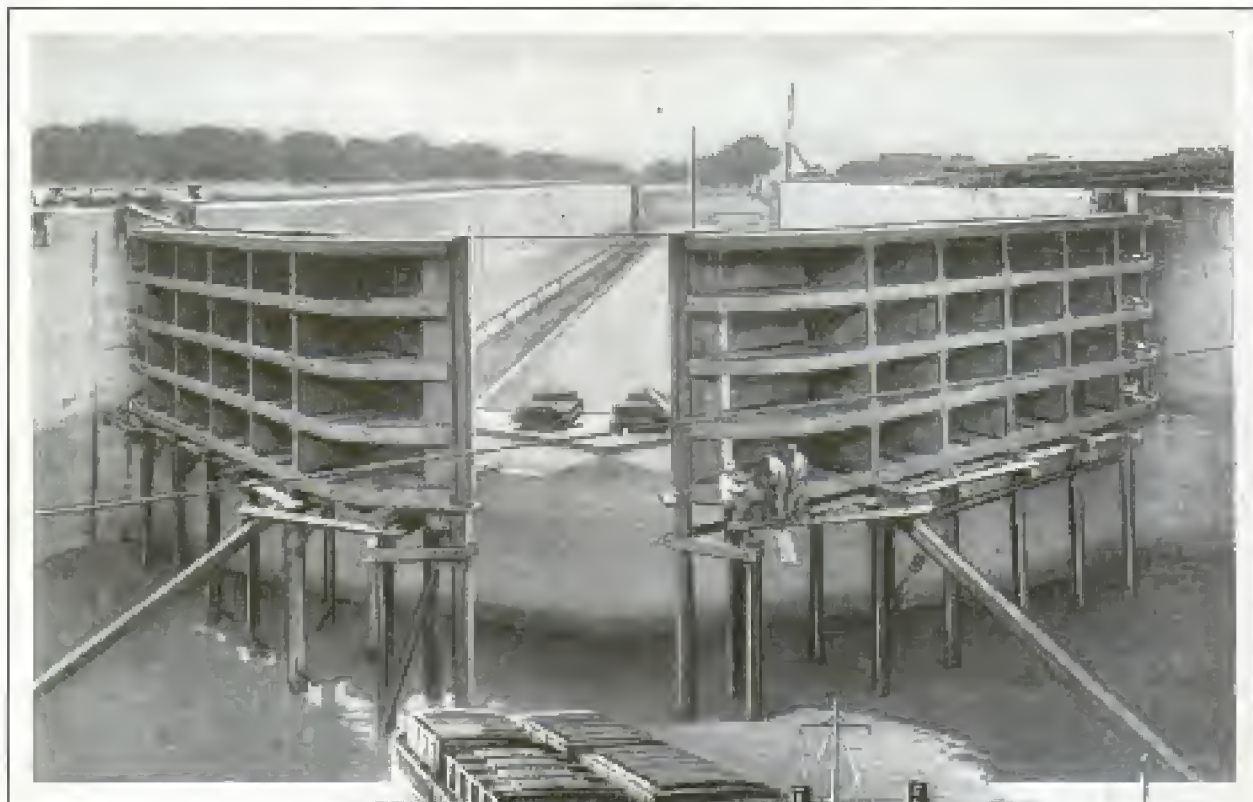
channel. All this is in addition to the \$35,000,000 appropriated last year for flood control which will go to the building of revetments and other levee work, and to the construction of spillways and reservoirs along the lower Mississippi.

Now, what is happening as a result of this reawakening of the Mississippi? Freight tonnage carried on the Ohio and Mississippi increased from 33,950,132 tons in 1918, to 73,274,224 in 1927 (the last year of complete tabulated returns). Figures now being compiled by the government for 1930 indicate a vast increase over 1927.

Steamboating on the Father of Waters and its tributaries was once the wonder of the world. At that time 2,000 steamboats plied the rivers. Then came the railroads, providing a swifter, more modern means of transportation. River traffic declined and the steamboats disappeared because they couldn't meet the rivalry. At the beginning of the world war, the government, in an effort to provide a means of helping the overworked railroads, established a federal barge line on the Mississippi and some of its tributaries. It was merely to serve as a war-time expedient in helping to move loads of freight.

But the old type of Mississippi steam-



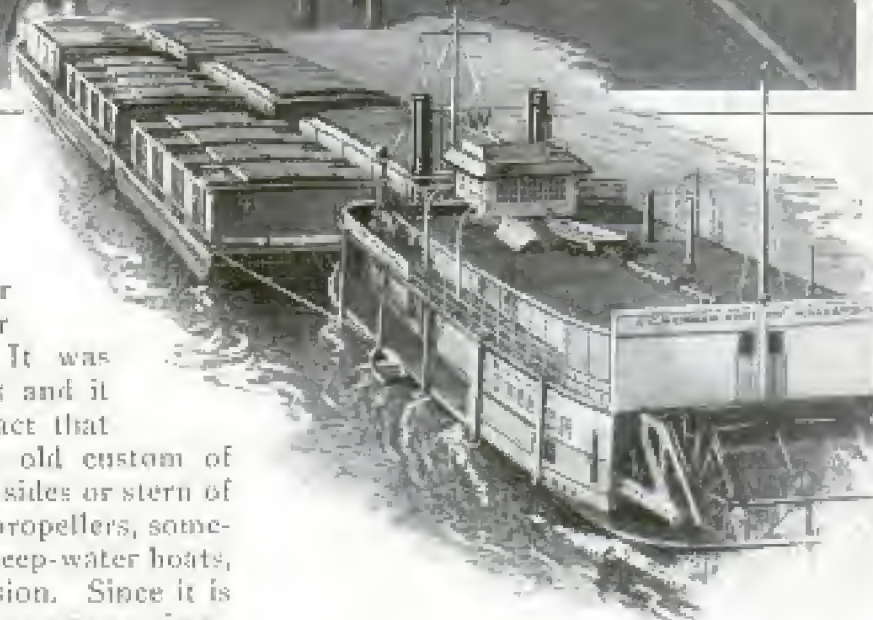


Placing the Great Gates of the Marseilles Lock on the Illinois Division of the Lakes-to-Gulf Waterway; Right, a Tow on the Upper Mississippi

boat proved unsuitable for this use, and a new carrier had to be developed. It was called the tunnel towboat and it got its name from the fact that builders, abandoning the old custom of using paddlewheels at the sides or stern of the boat, installed screw propellers, somewhat similar to those on deep-water boats, as the method of propulsion. Since it is difficult for propellers to operate on rivers as shallow as those of the Mississippi system, the screw on these new river towboats had to be set in a hollow place scooped out from the bottom of the boat—a tunnel in short.

New barges were developed also—huge, roomy and made of steel, some of them 300 feet long, capable of carrying 3,000 tons or the equivalent of fifty railroad carloads. A group of from three to ten of these barges, loaded with freight of all kinds, can be lashed securely together into one tow. Then the tunnel boat, getting behind the whole great mass, pushes it down the river.

So successful did this federal barge line prove that, when the war was over, Uncle



Sam was unwilling to give it up. Re-organized upon a peace-time basis, it has continued to operate upon a growing scale. From that first tunnel-type boat, built in 1918, a vast new inland merchant marine has grown up. These boats are powered by the latest type of condensing steam engines or Diesel motors. Some are oil burners and others have turbo-electric drive.

If you stand on the wharf at the old river port of Cairo, Ill., you will get a cross-section picture of river activities as they are today. For at this junction point of those two great rivers, the Ohio and the Mississippi, one may see all the va-



rious types of modern steamboats which travel the water roads in this year 1931, as well as some of the old boats that still survive.

A whistle blows up the Ohio—a blended musical whistle of five tones. And around the bend comes a majestic sidewheel passenger boat (among the last of her kind) from Cincinnati. She sweeps gallantly in, looking from the exterior much like the old wooden sidewheelers of yesteryear. But she's made of steel from fantail to "timber" head. Then comes a mighty sternwheel towboat—long, low, slender; smokestacks well forward, mighty fore-and-aft hog chains on her upper deck, making her look rather like a sort of floating suspension bridge; a gargantuan sternwheel kicking up a little ocean behind. She is an old-timer, but has been modernized. She is the "Sprague" and has become an institution on the rivers. Her job these days is to convoy tows of petroleum products in floating tanks northward from the Standard Oil refineries at Baton Rouge, Louisiana.

From down the river in the direction of New Orleans, a big tow of very small barges comes breasting upstream. Wedge-shaped at bow and stern, these barges are designed to carry package freight and bulk freight in small quantities. The wedge-shaped ends permit of their being grouped together in tows more snugly than the flat-end barges could be grouped.

And so, slowly but surely, the Father of Waters is regaining prestige as a carrier of the nation's burdens.

A. 60

#### PAPER MADE FROM ASPARAGUS

Paper is being made from the refuse ends of asparagus by one European manufacturer who has found asparagus paper costs only about half as much as a similar quality made from rags. Still greater economy was obtained in the process by mixing the pulp of the asparagus ends with that of beet roots.



Grammar School in Holland with Glass Walls; the Walls Are Easily Opened, Thus Placing Pupils Virtually Outdoors in Good Weather

#### SCHOOL WITH GLASS WALLS GIVES OUTDOOR EFFECT

Glass walls are a feature of a large grammar school recently opened in Amsterdam, Holland. These walls are easily opened, thus making the classrooms virtually out of doors in good weather. There is also a roof garden for gym classes.

#### LIQUID GAS FOR RIFLE RANGE IS NOISELESS

A. 589

Noiseless shooting galleries, which are also safe and odorless, now are making their appearance in the form of liquid-gas rifle ranges. The twenty-two-caliber repeating rifles use the gas instead of powder to speed the bullets at the targets. The guns need not be pumped.



Liquid-Gas Rifle Range Shooting Gallery Noiseless

Eng. Franklin Institute

Liquid Gas Rifle Ranges, Inc. Rochester, N.Y.



a. 365



School Children Getting Their First Glimpse of a Cow and Calf; the Truck Hauls the Animals from One School to Another

### CITY CHILDREN SEE FIRST COW IN A "BOVINE LIMOUSINE"

When one-fourth of the elementary-school children in Los Angeles admitted in a recent survey that they had never seen a cow, and fifty per cent said they had never looked at a calf, the visual-education department of the board of education decided something should be done about it. A cow and her calf were placed on a truck body over which was a canopy, and this "bovine limousine" began a tour of the city schools. At each stop, the display attracted as much attention as though it had been an animal cage from a circus.

a. 627

### WANTED—A USE FOR "FLY ASH"

Fly ash, the fine, glasslike ash given off by modern coal-burning power stations, offers a challenge to inventive genius. The stations give off tons of this ash which science has been able to keep out of the air by electric precipitation and other methods, but for which no use has thus far been found. The material is extremely light and fine, and hence of great bulk and hard to handle. It has been impossible

to use it in any process of manufacture yet devised, although it offers a concentrated material at virtually no cost. Eventually, it is predicted by chemists, someone will discover what to do with it, and the resulting product may mean a fortune to the man who solves the problem.

### AUTOMATIC REEL FOR GARDEN HOSE

a. 587

Protecting the garden hose from rough usage, rotting, kinking and freezing, an automatic reel can be installed in the basement where it winds up the hose as soon as sprinkling is finished. Ordinarily it is placed in the basement roof and connected to the water supply, the nozzle extending through an opening in the wall. Only a gentle pull is required to extend the hose to any length, a ratchet keeping it locked at every point. When a key beside the nozzle plate is turned, the spring is released and the hose is reeled up and automatically locked. A key wrench unlocks the reel and turns the water on and off.



Automatic Garden-Hose Reel for Basement, Which Winds Up the Hose When Sprinkling Is Finished

Mr. Harrison E. Howe  
American Chemical  
Society, 414-4th Ave. New York  
Little Island, N.Y.  
1401-3rd Ave. New York  
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a. 556



Part of the "Brains" of a Transatlantic Liner; Operators Are Letting Steam Rush into the Turbines of the "Paris" While Watching the Many Instruments and Controls before Them

## "BRAINS" OF AN ATLANTIC LINER A MAZE OF INSTRUMENTS

An unusual photograph of part of the "brains" of an Atlantic liner was obtained recently as the "Paris" prepared to sail. In front of a maze of almost countless instruments, operators are shown letting the steam rush into the turbines while keeping close watch on the many control and regulating devices.

## A VARNISH WITHOUT AN ODOR

For use particularly in close proximity to foodstuffs, an odorless varnish has recently been developed. This varnish makes possible the use of laminated board in the manufacture of refrigerators. Heretofore this light, inexpensive and durable material could not be used because of its faint phenyl odor.

## SILVER BEADS PURIFY WATER BY ELECTROCUTING GERMS

Harmful germs in water are electrocuted by a sterilizing process developed in England that uses neither chemicals nor filters. Instead the water is purified

by simply immersing specially treated silver beads in it. It has long been known that certain metals, including silver, gold and palladium, have the property of destroying bacteria when brought in contact with them, and the sterilizer accelerates what is called the "oligo-dynamical" action so that water is made germfree in one or two hours. Water so treated has powerful sterilizing properties of its own and may be used for washing nursing



bottles, cooking utensils and surgical instruments. The life of the device is virtually unlimited, one set of beads being capable of dealing with 250,000 gallons of water before deteriorating. The silver beads are prepared in highly active form, but since

there is a limit to the amount that will go into solution in water, there is no danger of an overdosage. The beads can be immersed in any ordinary vessel.

Industrial Engineering Chemistry

General Plastic

with Casanova

Reported by Arthur Norton, General Plastic

North Casanova

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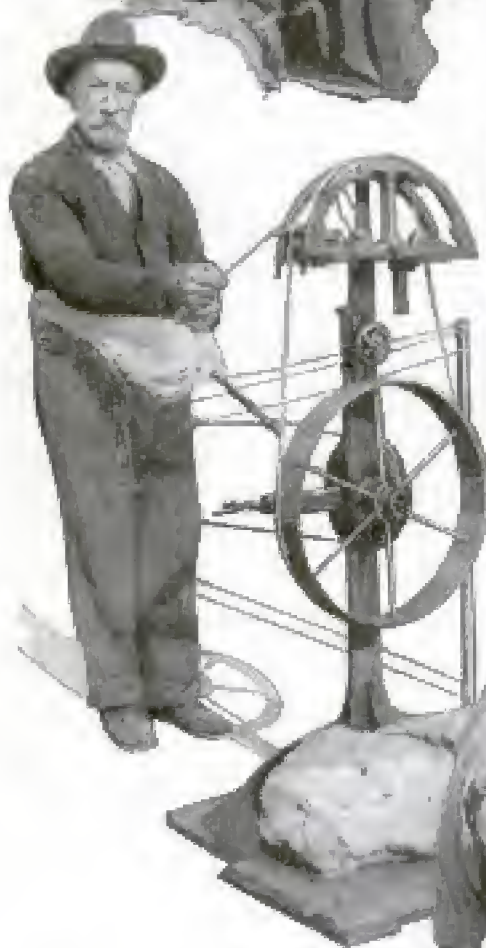
The British Catadyn Co. Ltd. London W.C.1. Eng. Sentinil House, Villamartin Road, Antigua, Barbados. 3/24/31



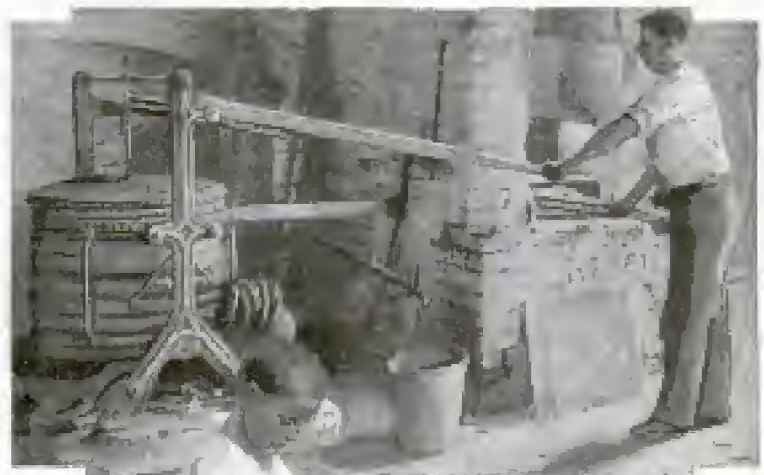
# Where Primitive



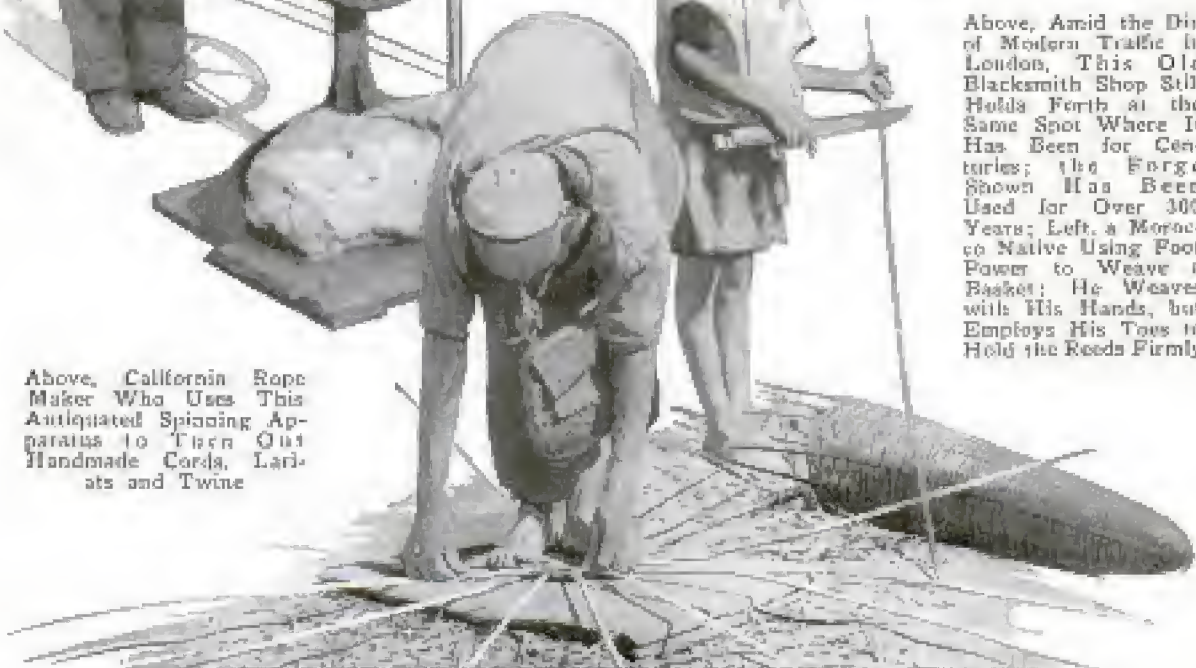
Spinning Cotton Thread to Be Made into Garments for People of India



Above, California Rope Maker Who Uses This Antiquated Spinning Apparatus to Turn Out Handmade Cords, Lariats and Twine



Above, Amid the Din of Modern Traffic in London, This Old Blacksmith Shop Still Holds Forth at the Same Spot Where It Has Been for Centuries; the Forge Shown Has Been Used for Over 300 Years; Left, a Morocco Native Using Foot Power to Weave a Basket; He Weaves with His Hands, but Employs His Toes to Hold the Reeds Firmly





# Methods *still* Rule



Above, Chinese Natives Using Foot Power to Run a Pump Employed to Irrigate a Rice Plantation



Above, Japanese Women Coaling a Steamer at Nagasaki: It Has Been Found That the Labor of Women for This Purpose Is Less Costly Than Would Be the Installation and Upkeep of Modern Machinery



Left, Women Grinding Grain by Primitive Method That Is Still Used in Many Parts of World



A-453  
986

Designed by  
Prof. *Lanternburg*

The Magnetic  
Mfg. Co.  
275-23rd Ave.  
Milwaukee, Wis.  
MAGNETIC SEPARATOR  
FOR ORE WORKS



Germany Has Remembered the Horses That Served Her Armies in the War with This Monument Erected in Berlin

## MEMORIAL TO HORSES IN WAR ERECTED IN GERMANY

One of the most imposing monuments ever constructed to honor man's four-footed friends has been erected in Berlin as an appreciation of the services rendered by horses to the German army during the world war. The designs on the faces show horses in various war-time activities.

## PLANTS RIDDEN OF RED SPIDER BY SPRAYING WITH GLUE

Red spiders, the pests of horticulturists, now are being literally "stuck up." Poison sprays kill the spiders themselves, but the eggs remain immune and so the spray must be repeated about every ten days. Recently the Missouri state botanic gardens tried powdered glue for this purpose successfully. About a pound of glue was dissolved in four or five gallons of water and this was sprayed on the plants. Within two days the glue hardened, cracked and peeled off, taking eggs and spiders with it.

## A-406 CHEAPLY

To solve the problem of profitably marketing low-grade ores, one company has made a magnetic separator to remove the valuable portions of raw material inexpensively. The ore is poured into a hopper and falls over a series of electromagnetized rolls. As it passes successively from roll to roll, magnetic and non-magnetic materials are separated automatically. The machine can handle about five tons of feebly magnetic ores an hour.

## GOLF-DRIVE ACCURACY TOLD BY FLASHING OF LIGHTS

Operating somewhat like the old amusement park device that rang a bell when a weight was forced upward by a hammer blow, a golf-drive scorer automatically checks the distance and accuracy of each shot. The apparatus is an upright register fixed in the ground. The ball is teed and secured on a metal arm which hammers down on a similar device when the drive is made. This drives a second ball up the register to indicate the yardage the hit ball would have made down the fairway. A system of lights at the top shows whether the drive was sliced or hooked, the accuracy with which the ball on the driving arm strikes the plunger determining this.



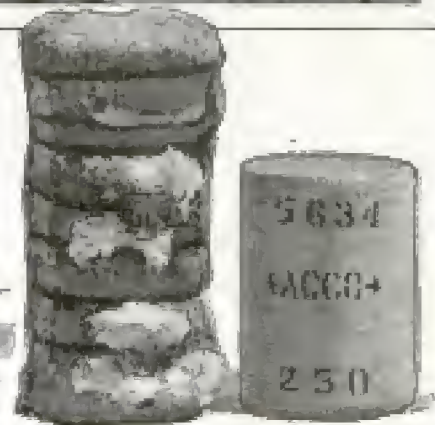
Automatic Scorer Which Indicates by Lights the Accuracy of a Golf Drive and the Distance

used in *Helena*  
cannot locate



# COTTON GIN ON WHEELS TURNS OUT ROUND BALES

A curious contraption on wheels has been traveling over the railroads of western Mexico, where



Portable Cotton Gin Built in a Box Car, and Some of the Round Bales Turned Out by This and Other Stationary Gins

many thousands of acres have lately been planted to cotton in regions where cotton gins, if present at all, are few and far between. In this emergency, an enterprising Texas firm conceived the idea of building a gin into a box car and sending it to the cotton—instead of depending on the more toilsome process of bringing the cotton over the mountains to the gin. The "despepitamovil," as this box-car gin is called, spent a busy fall and winter, moving from place to place much as a circus does, and turned out many thousands of neat round bales. The despepitamovil is the only machine of its kind, but there are some 300 of its more stationary brothers now scattered over Texas and Oklahoma. These are the new-style gins which turn out cotton pressed to high density in compact cylinders of 250 pounds each, in place of the old-style square bale. Cotton is America's most important com-

modity in foreign trade. It fills more shipholds and brings more foreign gold our way than any other American product. The old conventional square bale, with its bulging front and back, its exposed sides, cut bagging, and bulky shape has long been condemned as wasteful, costly to handle, and liable to fire risk, pilferage and weather damage. The more compact round bale, which is pressed once for all and requires no compressing or re-compressing, has been coming increasingly to the fore in recent years.

A 603

## GRAPES ARE KEPT ALL WINTER

One variety of grapes, the Urbana, developed by the New York agricultural experiment station, can be kept in a cool cellar all winter without spoiling. The grapes are of good quality and in tests have been kept until March without decaying or shriveling.

Conf. E. S. Moore, 3767  
Oliver St. N. W.  
Washington, D. C.



A-613



Workmen Cleaning the Historic Notre Dame Cathedral; Note the Man Perched on the Column in the Picture at the Right

### GRIME OF CENTURIES CUT FROM WALLS OF CHURCH

For the first time in 150 years, Notre Dame de Rouen, Normandy's celebrated Gothic cathedral, recently was given a thorough cleaning. Vacuum pumps were used to remove the ravages of time, and when completed, the renovated structure was restored to much of its former beauty.

### SUPERSENSITIVE PICTURE FILM REQUIRES LESS LIGHT

As an aid to commercial photography, particularly in making pictures of factory interiors, the Eastman Kodak company has developed a supersensitive panchromatic film several times faster than the ordinary film and plates. The term "fast" means the degree of light sensitivity of the emulsion, and the increase in light sensitivity enables pictures to be made with one-third to one-fifth as much artificial light, or, if the same amount of light is used, the exposure period can be greatly decreased. This high-speed film is extremely sensitive to red, yellow and green, in addition to blue and violet rays. This

is a distinct advantage over ordinary "color-blind" photographic material, since artificial light is full of the red, yellow and green rays. The film enables photographers to make pictures of interiors or close-ups of machines and operators without the use of flashlights and with greatly de-



creased artificial illumination. The film likewise will be of aid in photo-micrographic work and in astronomical photography, where the necessary time for exposing plates can be decreased. The panchromatic emulsion also is available for moving-picture film and requires considerably less lighting for making good movies, but cannot be exposed to light of any color in a dark room without fogging.

### GASKET EXPANDS UNDER HEAT TO FILL UNEVEN SURFACE

Where copper-asbestos or solid-copper gaskets will not hold because of intense heat, a metallic gasket, made of alternating layers of sheet aluminum, fine wire mesh and a heat-resisting compound, now is being used successfully. Exposure to heat causes the gasket to swell and then harden, the expansion tightening it against the walls and forming it in any warped or uneven shape.

Rochester, N.Y.

Field Products Inc.  
1508 Carroll Ave.  
Chicago, Ill.



And. E. Es Moore A. 389  
 376 7 Oliver St  
 N.W. Washington, D.C.

## QUICK-FREEZING FRUIT IS SOUGHT

Plant breeders of the department of agriculture are trying to develop new varieties of fruits and vegetables particularly adapted to quick freezing. Since the recent growth of the quick-freezing industry, both fruits and vegetables are being frozen successfully, and kept in solid form until delivered to the consumer to preserve their freshness. It has been found that fruits and vegetables suited for canning are not always the best for freezing.

## AIR-MARKER TOWER SYSTEM TO GUIDE AVIATORS

Sixty thousand aerial guideposts in the form of sixty-foot towers may direct aviators in the day when thousands will fly the airplanes in their own planes. A Cleveland man has built the first tower in that city and proposes to build many more, each carrying code letters expressing the latitude and longitude at or near which it is built. This will enable the pilot to follow his route.



Aerial Guidepost Which Carries Latitude and Longitude Markings for the Airplane Pilot to Read



Tiny Respirator for Infants in Which Babies Suffering from Pulmonary Troubles Are Placed for Treatment

## TINY RESPIRATOR FOR INFANTS TO SAVE LIVES

One Chicago hospital has installed a tiny respirator which is being used for infants suffering with pulmonary troubles. It also is being employed successfully in inducing breathing in new-born babes when respiration must be forced. Previously, the oxygen mask or some physical method was used in cases of this kind, but irritation often was caused, while the machine works as gently as natural breathing. The lives of several infants already have been saved with the respirator.

## SAFETY SWITCH CUTS IGNITION WHEN AUTO OVERTURNS

Much of the danger of fire when an automobile overturns is eliminated with a safety switch now being offered which cuts the ignition if the car turns over or is in a violent collision. The switch does not ground the current and kill the engine, but cuts the ignition entirely, thereby stopping the motor. Rough roads or sideways will not cause the switch to operate, however. It can be attached to the dash under the hood, and in the event of a collision, the main body of the device falls forward, thus stopping the engine.

Ludo L. Jernstedt

J. & W. Sprague  
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 Carcon. Mo



# Making Home

A-820

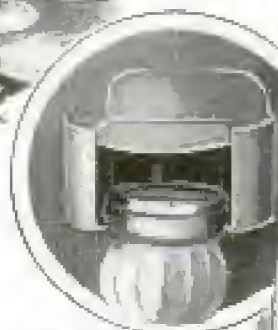


Electric Dish-Washing Machine That Is Entirely Automatic; Soiled Dishes Are Fed in One Side, and Come Out the Other Side Clean and Rinsed; Automatic Soaping Is a Feature; Pots and Pans Can Also Be Washed

Right, Sanitary Ash Receiver Which Contains Deodorant and Is Easily Cleaned



A-321



A-340

Left, Adjustable Nutcracker Made to Fit Any Size by Changing of a Notched Lever

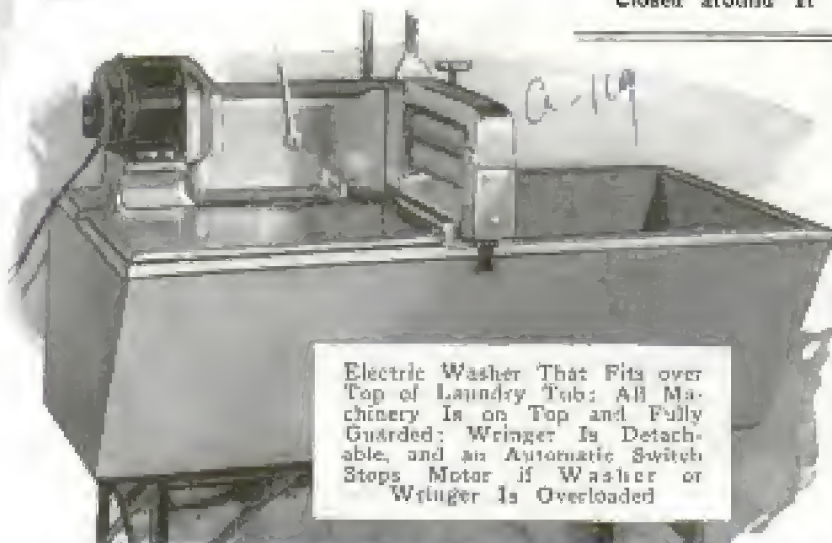


Above, Milk-Bottle Holder Which Locks Automatically When Top of Container Is Fitted into It and the Sides Are Closed around It

A-411



Water-Pressure Drain Cleaner with a Corkscrew Spring Which Fastens Cleaner to Strainer or Crossbar in Sink, Creating a Tight Seal and Allowing Pressure of Water System to Clean Drain



Electric Washer That Fits over Top of Laundry Tubs; All Machinery Is on Top and Fully Guarded; Wringer Is Detachable, and an Automatic Switch Stops Motor if Washer or Wringer Is Overloaded

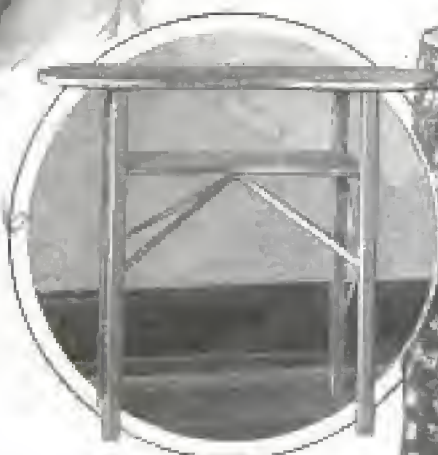


# Tasks a Pleasure



Above, Nail File Curved to Fit the Nails and Fingers

Below and at Right, Vanity-Table Set That Folds Like an Ironing Board and Is Locked in Place with a Wingnut; Folding Bench Is Included; It Is Well Suited to a Summer Cottage



Left, Chain and Metal Attachment for Holding Bath-tub Spray or Bath Brush on the Faucet; the Device Is Adjustable



Right, Adjustable Closet Shelf Held Up by Friction against the Walls



Left, Adjustable Metal Reading Stand and Light for the Desk, Chair or Bed; It Holds the Pages Open and Can Be Placed at Any Angle and at Any Distance from the Eyes; Right, Cake of Coffee Which Slips over Tube of Percolator and Makes Two Cups of Coffee, Thus Eliminating Measuring Devices





L. Gordon S. Mitchell  
58 18 1/4 La Mirada Ave  
Hollywood Calif

992

POPULAR MECHANICS

Hollywood Calif

## SHELL FOR ANTI-AIRCRAFT GUN HAS WIDE EFFECTIVE AREA

Tests have been conducted recently with a three-inch shell for anti-aircraft guns which is capable of filling 4,500,000 cubic feet of space with jagged fragments. The average over-all density of fragmentation is one piece to every six yards of surface presented anywhere within the area. Close together near the bursting shell, and gradually thinning out farther away, the fragments are thrown off with a velocity of 4,000 feet per second. The shell has an effective burst in two directions, the area covered resembling a huge umbrella. The nose spray covers the forward area, while side spray covers the lateral portions. An airplane of average size, caught anywhere in this danger zone, would receive from four to fifteen fragments in vital parts. Anti-aircraft artillerymen practice with the guns by firing at a target towed behind an airplane at a height of 10,000 feet. A hit is chalked for the gun crew if the shell bursts anywhere within the effective area.

Sending and Receiving Equipment of a Radio Typewriter Which Is Actuated by Wireless Impulses

## TYPEWRITER IS RUN BY RADIO; KEEPS MESSAGES SECRET

Messages may be sent by radio and received in typewritten form through a combination wireless and typewriter apparatus known as a "Watsograph." There is no limit to the speed of sending except the ability of the typist, theoretically about 1,200 letters a minute. The essentials of the mechanism are two identical revolving contact arms, electrically driven and synchronized, each passing in revolution over insulated segments. Each segment of the sending mechanism is connected with a key of the sending typewriter, and similar connections are made from the segments to the keys of the receiver. Contacts on the sending segments release short waves through the usual radio apparatus, and these are picked up by the receiving machine. With the multiple variations in short-wave impulses, reception of messages can be confined to an apparatus tuned to the same wavelength and the same speed, while other machines would record an unintelligible jumble of letters.

## ICE SLEDGE WITH PLANE WING INSTEAD OF A SAIL

Successful tests recently were conducted in Germany with an ice-sailing sledge equipped with an airplane wing instead of the customary sail. The wing is easily manipulated and gives a delicate control that offers great maneuverability.



Ice-Sailing Sledge Equipped with an Airplane Wing Instead of the Customary Sail; the Wing Gives a Delicate Control to the Vehicle

Built by Engineer Budig  
used on the German sea,  
near Berlin

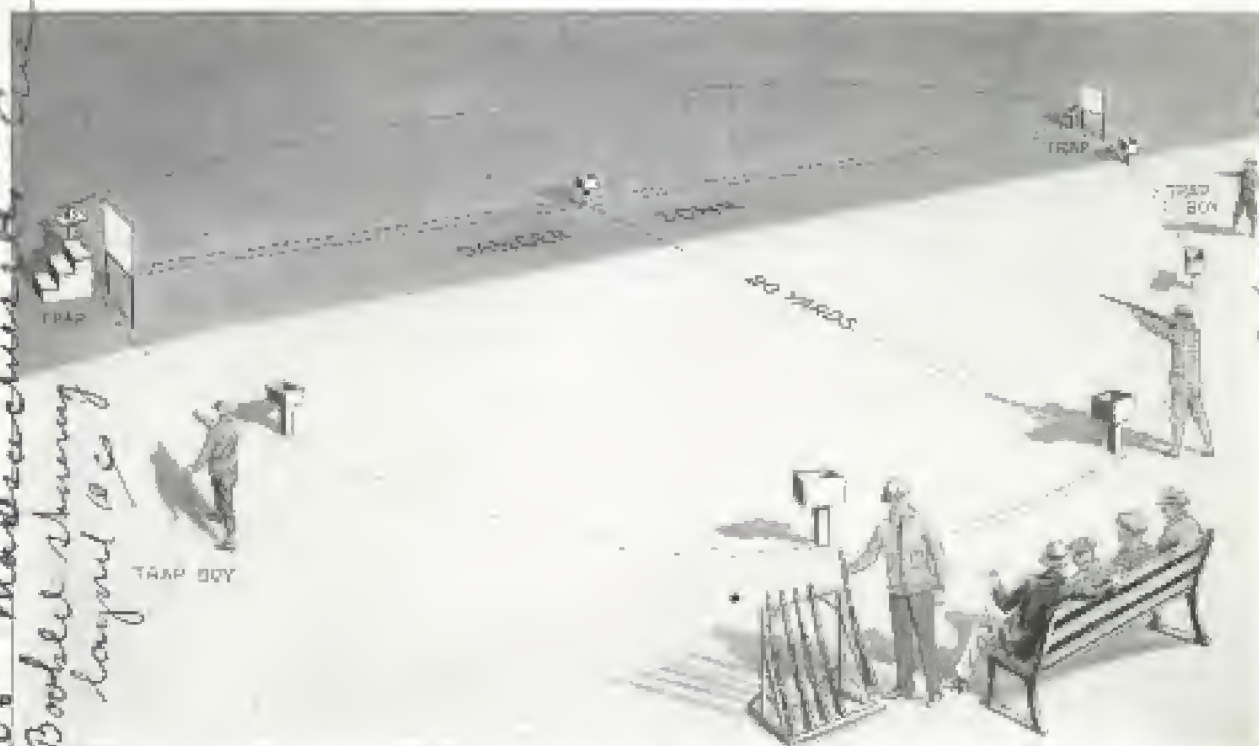
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a-585 at the Port shooting Park  
near Wilmington 993

POPULAR MECHANICS

SKEET—LATEST YEAR-ROUND SPORT FOR HUNTERS



Drawing of a Skeet Range, a Form of Trapshooting in Which the Contestants Fire from Various Stations about a Semicircular Course, Thus Changing the Conditions for Each Shot

Some of the thrills of bird hunting are provided in a sport called "skeet" that is attracting many gun lovers. The shooting course is laid out in the form of a semicircle with the traps that release the clay targets at each end of the range. About the border of the circle are various stations, the contestant moving from one station to another to make his shots. This sport compares with trapshooting much as golf compares with putting, because the change of position and the moving from one trap to another vary the possibilities. "Doubles" also are possible when targets are released from both traps.

NOISELESS CITY IS PREDICTED  
WITHIN TEN YEARS

Within ten years the modern city will be a fairly comfortable place in which to live, as far as noise is concerned. This is the prediction of Edward F. Brown, director of the noise-abatement commission of New York City, who believes that in another decade the large metropolis will enjoy silent riveting machines, more melodious auto horns, quieter subways and sound ventilators for windows which will keep out all unpleasant noises. Buildings

of the future, he believes, will be erected to be soundproof just as they now are built to be fireproof. As a result of consultation with auto-horn manufacturers, only seven per cent of the horns now being made are objectionable from a noise standpoint, as compared with ninety-five per cent a year ago, he says. Much insanity he attributed to unnecessary noises, and considerable nervous trouble to disturbed sleep.

FLANGES IN METAL TIRE COVER  
MAKE REMOVAL EASY



raised, so the cover can be slipped over the tire. When the lever is depressed, the flanges lock the cover securely.

Metal covers for the spare tire can be placed in position or removed in a few seconds if fitted with metal flanges in the inner edge to hold them in position. These flanges expand when a lever is

NY Times 3/10/31

Dura. Products Inc. Canton, Ohio

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Write Secretary of National Skeet Shooting Association  
106 Madison Avenue  
New York City

Skeet shooting and Skeet loading  
Wilmington Delaware  
806 Duane St. Wilmington, Del.



A. 591 Cml. C. J.  
Galmann. 90

994  
Chicago 200 40. Washington

Cudahy Bros plant  
Cudahy Wis



Crude Rain-Recording Gauge in a Village in Assam, Which Is Known as Wettest Spot in the World

## WETTEST SPOT IN THE WORLD IS FOUND IN ASSAM

If Cherra Punji, in the hills of Assam, were a city instead of a tiny village, it would be a fine market for umbrellas, for it holds the blue ribbon for wetness among the 3,500 weather stations of the globe. A few other places, including a mountain top in the Hawaiian islands, sometimes have disputed its rivalry, but Cherra Punji is still the world's wettest spot. The latest average rainfall for the town, based on a forty-nine-year record, is 428 inches a year, about ten or twelve times the average for the majority of places in the northeastern quarter of this country. However, the British weather bureau's official gauge is not in the wettest part of the village, for there are several unofficial ones that show higher averages. In August, 1841, the town's rainfall was 241 inches, or more than twenty feet, and in June, 1876, more than forty inches of rain fell in twenty-four hours. The phenomenal rainfall is explained by the location. The village lies in the path of the southwest monsoon winds, which are moist and also blow over flooded lowlands in the summer. The town occupies

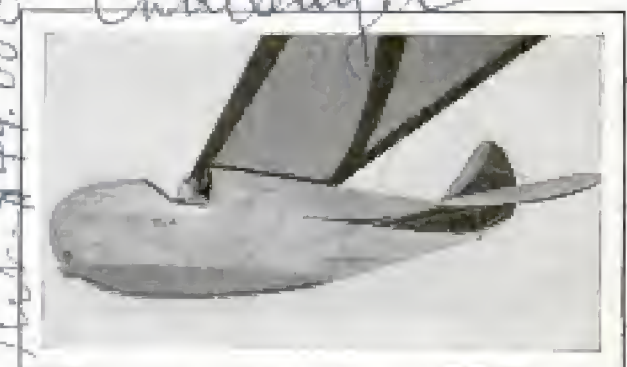
a small plateau at the head of a steep-walled valley which concentrates the winds and deflects them upward, causing them to cool and condense their moisture.

## ELECTRIC "CHAIR" FOR CATTLE USED IN PACKING PLANT

Cattle in one packing plant now are being stunned with electricity, instead of by the sledge-hammer method heretofore used. The cattle are first taken up a 160-foot stepped runway to the fourth floor and into a pen, three at a time, to be electrocuted. The animal is raised a few inches off the floor and an electrode, on a long pole, is touched to a good conductor behind the ear. This is considered a more humane method of killing, and also produces better-colored fat and meat.

## THIS GLIDER IS CONVERTIBLE FROM PRIMARY TO SOARING

Glider enthusiasts who recognize the utility of the convertible automobile, now can obtain a convertible glider that is changed with little trouble from a primary, or training type, to a streamlined, or soaring type of ship. In the latter form, fully inclosed, the craft weighs only 138 pounds, has a wing span of thirty-two feet and an over-all length of eighteen and one-half feet. This glider can be obtained knocked down with full instructions and blueprints for assembling, or it can be purchased ready to fly. It is intended particularly for those who desire a double-purpose ship. In its primary form, without covering for the fuselage, it makes a sturdy training craft, and after mastering the essentials of flying, the owner can change it to a sail plane.



Lightweight Streamlined Glider Which Can Be Used as a Training Ship Before Fuselage Is Covered

Mead Glider 12 market. Chicago

Chicago 200 40. Washington  
structural material covering and tape. 25.00 for Chicago 200 40. Washington



A-423 H. B. Meller Head, Air  
Pollution Investigation  
Mellon Institute

# Soot-the Destroyer

THE GREAT cities of today with their skyscrapers, their libraries, their municipal buildings, their monuments, are being slowly but effectively leveled by soot. This black pall has been proved to be the greatest enemy of man's works.

Engineers of the Mellon Institute, of the University of Pittsburgh, have concluded a series of investigations that bring forth new and little known facts concerning the destructive effects of soot. These have to do with its effect not only upon buildings and the exterior of cities but also upon the human beings who must live in our large cities.

H. B. Meller, head of the investigation, has shown that in industrial cities, the sootfall amounts to hundreds of tons per square mile in a single year. This deposit may contain several per cent of tarry matter and twenty to thirty per cent of fixed carbon. It is easy to see that with such a steady down-pour a city would eventually be well covered with a layer of soot that might puzzle the scientists of the future.

Smoke has long been recognized as a real hazard to life and property in cities, but when smoke becomes the carrier of soot, as Mr. Meller discovers, it becomes of far greater destructive power. He observes that "in the city, fogs become mixed with smoke to such an extent that their color is frequently changed from white to brown, or even black, and their density is so increased that they are almost opaque to sunlight. Then the absorption by soot



Above, Quartz Spectograph for Measuring Solar Radiation; Below, Apparatus Used to Collect Samples of Dust for Analysis

particles of moisture from the fog so increases their weight that they quickly settle in an oily or tarry substance over all buildings.

"The tar causes the soot to adhere firmly to any surface with which it comes in contact, literally covering the object with a coating of black paint and penetrating into the porous structure."

Within the soot there are powerful corroding agents, such as sulphuric acid and hydrochloric acid. "It might not seem that the amount of acid coming from the chimneys of a large city would be sufficient to do much harm," says Mr. Meller.





Above, Collecting a Sample of Air with a Jet Dust Counter; Right, Measuring Dust Deposited from the Atmosphere

"However, coal as fired contains an average of at least one per cent sulphur, or twenty pounds per ton of coal, and, say seventy-five per cent of this constituent, or fifteen pounds per ton of coal burned, escapes into the atmosphere. If, for example, this is considered as sulphuric acid, it would be equivalent to forty-six pounds, which, if it all acted on limestone would destroy forty-seven pounds."

Mr. Meller finds that the acids found in soot, sticking as it does to any surface, cause even marbles, cements and stones to break down. The sooty acids bring about a chemical action involving a change in volume and this in turn brings about a change in pressure because the sulphate crystals grow in different directions. Mortar, particularly, his experiments showed, broke down, became brittle and was useless as a binding agent.

In concrete, the sooty gas filled with acids has an even worse effect since it reacts upon the aluminate of the cement, forming a complex substance the volume of which is three times that of the original aluminate. The tiny crystals that are produced grow within the porous cement

acting like millions of tiny jacks, producing a tremendous pressure in aggregate.

Soot in the air is even more destructive to metals. Upon iron it causes corrosion and with free carbon present there is an electrical effect. Soot is electro-negative while iron and other metals are electro-positive. Thus galvanic action takes place.

"Fine soot," says Mr. Meller, "as an impalpable powder, will go anywhere and everywhere that air does, and the tarry matter with it causes much of it to adhere firmly to any surface with which it comes in contact. There is not a paint or a wall covering that is not susceptible



to damage and the life of which is not shortened by soot."

The smoky, sooty air of large cities has a detrimental effect upon the people. "On clear, dry, sunny days, persons are more active, aggressive and enterprising. On the other hand, dark, humid days are devitalizing.

"When it is remembered," Mr. Meller continued, "that the average person breathes about thirty cubic inches of air in each inhalation—equivalent to approximately thirty-seven and a half pounds of air per day, or about seven times the weight of food and water consumed—it does not seem an exaggeration to say that more persons are devitalized, disabled and poisoned by the impurities contained in the smoky, sooty air than by the ingredients in food and water. The compounds enter the gastro-intestinal tract and cause



nausea, vomiting, diarrhea and systemic poisoning.

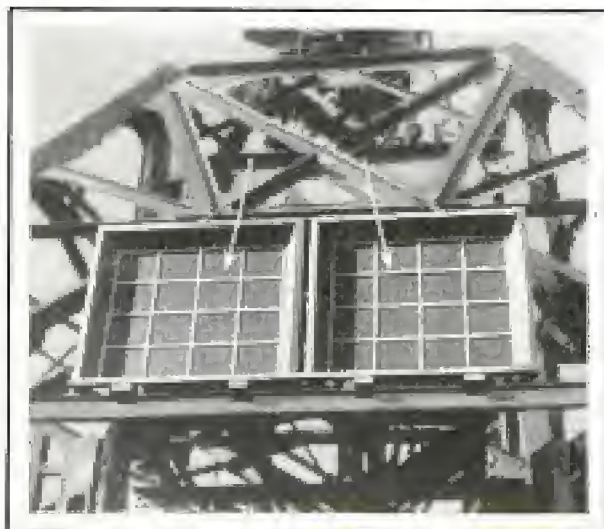
"Soot has a definite bactericidal action, probably due to its content of germicidal acid and phenols; it does not form a favorable place for the collection and distribution of bacteria, but, on the other hand, it so covers the streets and buildings and fills the air that it protects the micro-organisms from the destructive action of sunlight."

The experimental work of Mr. Meller was carried on in several large cities. By special apparatus the contents of the air at various places were analyzed and the effect of the compounds found in the air was noted as it was applied to various substances.

Mr. Meller believes that the city of the future will have to be a "White City," in order to survive. Heat will be electrically manufactured at the coal mine, or central stations will dispense heat. Already there are more than thirty companies in the steam business, mostly in the northern and central states.

## AMPLIFIERS ON MOORING MAST AID IN HANDLING AIRSHIP

Six loud speakers have been installed on the huge portable mooring mast for dirigibles at Lakehurst, N. J., as an aid in handling the big airships using this anchorage device. Officers in charge of ground crews as well as on the ships thus can issue orders to large groups of men, enabling them to work in unison.



Amplifiers on a Portable Mooring Mast, Which Aid in Relaying Orders in Anchoring an Airship

## BREAD FILLED WITH SUNSHINE BY ULTRAVIOLET RAYS



Filling Bread with Sunshine before Baking by Treating the Dough with Ultraviolet Radiation

Sunshine now can be baked into ordinary loaves of bread through irradiation of the dough with ultraviolet light. The bread is brought under the rays of this artificial form of sunlight in the process of baking by placing it within range of an ultraviolet-ray apparatus recently demonstrated in England.

## FLOWER BUDS ARE PRESERVED BY WAXING STEM TIPS

Buds of cut flowers can be preserved for a considerable period by cutting the stems to a length of about three inches and immediately sealing the ends with wax. When the buds have shrunk and wrinkled slightly, they are wrapped separately in paper and placed in a dry box until wanted. The flowers are then removed from the wrappings, the sealed ends clipped from the stems and the buds placed in water to which a little niter or common salt has been added, and left overnight. The buds thus treated will open and have all the fragrance of fresh cut flowers.

Those wishing further information on anything described in the editorial pages can obtain it by addressing Bureau of Information, Popular Mechanics Magazine, Chicago.

*Editor Franklin*  
*Constitutional*

*Demonstrated at  
Ice Cream and Bakers  
is in them. Bismarck  
Eng*

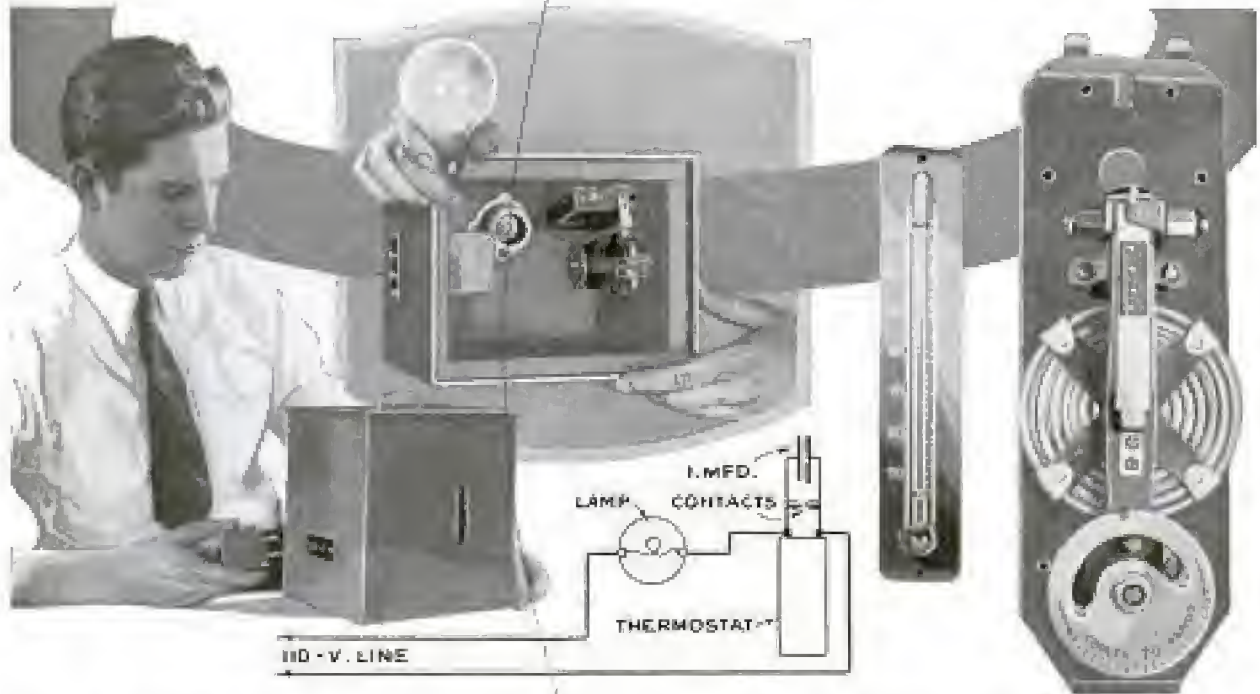
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*A-298*

*A-677*



## YOU CAN BUILD THIS TEMPERATURE-CONTROL BOX



An automatic heater for controlling the temperature within a limited space has a number of useful applications. Its use in radio for the temperature regulation of a quartz crystal governing the wavelength of the transmitter is quite important. If properly ground, the crystal will oscillate at a certain frequency, depending upon its thickness, when the circuit is tuned to the crystal's frequency. Expansion and contraction due to changing temperature will, of course, change this condition which can only be accurately regulated by a temperature-controlling device. Another use would be as an incubator for a practicing physician or classroom. A shelf may be easily constructed to hold specimen trays for such purposes. Very little information on the construction of an oven suitable for these purposes has been available to the experimenter. This oven is inexpensive to build and will control temperature within one degree Fahrenheit. It consists of a heat-insulated box in which a 60-watt light bulb is mounted together with a thermostat. This box may be of copper,  $6\frac{1}{2}$  by 8 by 9 in. in dimensions, or of wood if preferred. Masonite insulating board,  $\frac{1}{2}$  in. thick, is used to line the box in the manner shown in the center photo. A piece is cut to fit into the cover of the box and is held in position by means of the handle-mounting screws. Cut the

piece for the bottom full size for a tight fit. A small thermometer of the type shown is to be mounted in the side of the box as indicated below. Cut the opening in the box just long enough to expose the scale. The insulating pieces may now be placed in the sides and a piece of isinglass or thin sheet glass is placed between the lining and the box over the observation slot. A slot is cut also in the front of the box and jacks for the crystal holder may be mounted on a small strip of fiber. The thermostat is a standard type, easily available, and is held in position by means of two bolts. The 1-mid. 200-volt condenser is to absorb the spark caused by the make and break of the relay mounted at the top of the thermostat, shown in the photo at the extreme right. The porcelain socket for the 60-watt lamp is connected to a length of lampcord which is run out through a small hole drilled at the rear. The wiring is now completed as shown in the diagram, and the oven is ready for use. The relay can be adjusted for the temperature selected, and one hour should be allowed for the unit to reach the operating temperature.

Hum or line noises in the receiver may often be eliminated by reversing the a.c. plug connection at the wall socket, or plugging the set into another outlet.



# A Battery Substitute for D.C. Supply by Roy Little

**M**ANY cities still supply certain localities with direct current, and in such districts it is impossible to operate standard a.c. receivers without adding a converter to the installation, to change the 110-volt d.c. supply to 110-volt a.c. The added cost is frequently more than the price of the receiver itself, so that, in many cases, radio owners are forced, or choose, to use a battery-operated set. Granted that this type of receiver works satisfactorily, there is still the objection of having cumbersome batteries in the room, especially in apartment buildings.

The battery substitute to be described, when properly built and installed, will enable the owner of a battery-operated receiver to obtain the necessary A and B-supply directly from the 110-volt d.c. house mains and discard all batteries with the exception of perhaps a small C-battery. Of course, the total output of the unit is limited to about 100 volts for the B-supply; hence, if the set requires a total of 135 volts, it will be necessary to use one B-battery in series with the high-voltage tap to bring up the total. There are many battery sets that require only 90 volts maximum, and these may be operated directly from the output of the unit.

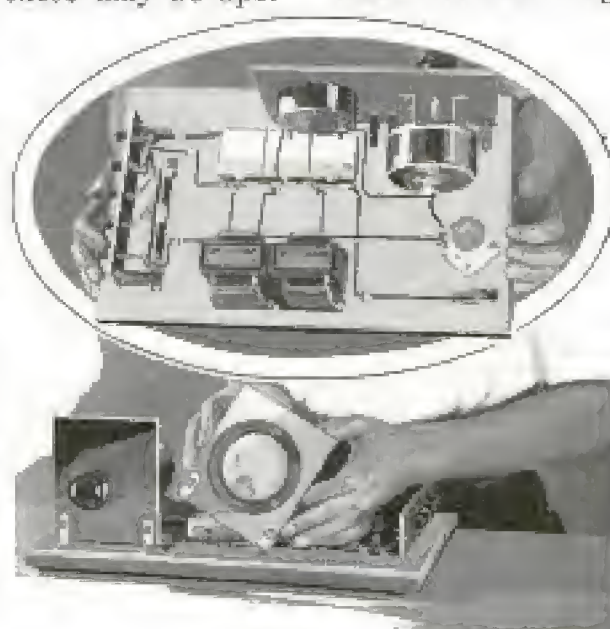
The substitute is connected to the set in the same manner as if A and B-batteries were used, and may be installed in, or near, the radio console. The only adjustment necessary is the filament voltage on the tubes, which is regulated with the heavy-duty rheostat indicated in Fig. 1. Adjust-



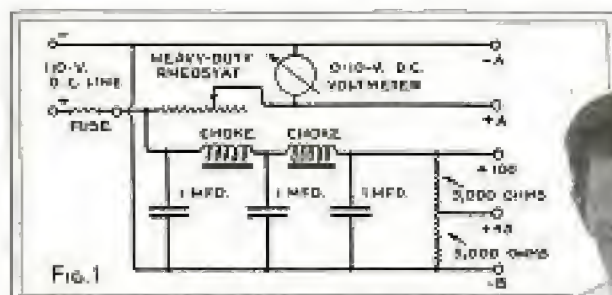
ment is accomplished by turning the knob until the voltmeter indicates 5 volts, the normal operating voltage of the ordinary battery tubes. The rheostat used is a power Clarostat, 10 to 200 ohms, 250-watt type, and the d.c. voltmeter may be either  $7\frac{1}{2}$  or 10 volts. The largest power tube that can be used satisfactorily with this unit, without adding a B-battery block, is the 112-A type.

The photos on this page show the simple layout of parts on a section of drawing board, 10 in. wide and 16 in. long. The binding posts at the left are mounted on a strip of bakelite,  $\frac{1}{8}$  by  $1\frac{1}{2}$  by 7 in., and this strip is supported at each end by means of small angle brackets. The volt-

age divider consists of a 50-watt center-tapped resistor of 10,000 ohms. This resistor is supported above the base-board by a small threaded metal rod running through it, and is held at each end by brackets. The three 1-mfd. fixed condensers are of the 200-volt type and are mounted flat on the base-board directly behind the voltmeter. The two 30-henry







choke coils are mounted near the edge of the board at the rear. The 110-volt d.c. line is connected directly to the porcelain single-fuse block and the binding post, which is mounted on an angle bracket, at the lower right. A 6-amp. fuse is recommended and should not be omitted from the circuit.

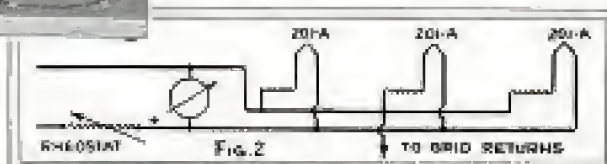
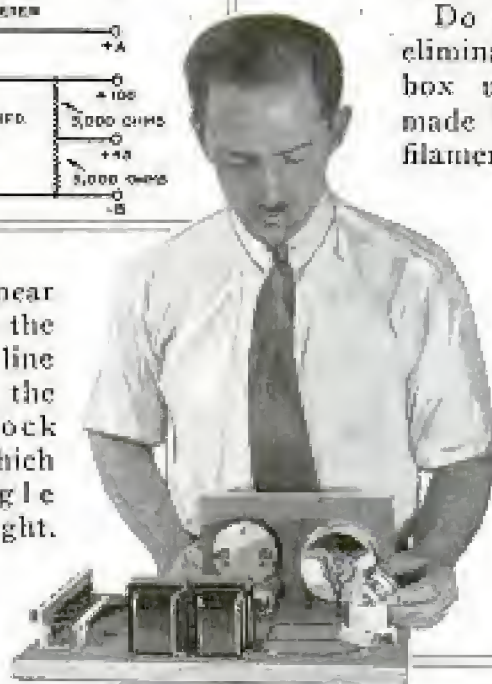
The lower photo shows the method of mounting the voltmeter and filament-control rheostat on small panels cut from scrap bakelite. This assembly may be varied to suit the needs of the builder and can be compacted into a much smaller space. The schematic diagram is given in Fig. 1, well insulated, heavy-duty stranded hook-up wire being used and all connections carefully soldered. Simplified wiring diagrams are also available.

C-bias may be obtained, without the aid of C-batteries, by using fixed resistors in the filament circuits, as shown in Fig. 2. Ten-ohm resistors will provide a 3-volt bias, and 5-ohm resistors, a bias of  $1\frac{1}{2}$  volts. The resistors are inserted in series with the negative filament lead of each tube to be biased, and the negative side of the filament line is then run to the grid returns. Small C-batteries, however, cost very little and last many months without renewal.

When plugging this battery substitute into the house mains, it is necessary to watch the voltmeter and see that it indicates in the right direction; if not, the plug in the wall socket should be reversed at once. When the correct position for the plug is determined, the plug and receptacle should be marked for polarity with white paint. Only three tubes are shown in the filament circuit, Fig. 2, but

this unit will handle up to seven 201-A tubes.

Do not attempt to inclose an eliminator of this type in a metal box unless ample provision is made for ventilation. When the filament supply has been regulated for a particular set, it requires no further attention; therefore, the installation may be made in the speaker compartment of the average console in the manner shown in the photo at the head of the article. If the builder wishes to combine the voltmeter and filament-supply rheostat on the front panel of the



receiver with the tuning controls, this can be done, but is not advised, as the power unit should be kept separate from the receiver and long leads should always be avoided.

### Speaker Built into Clockcase

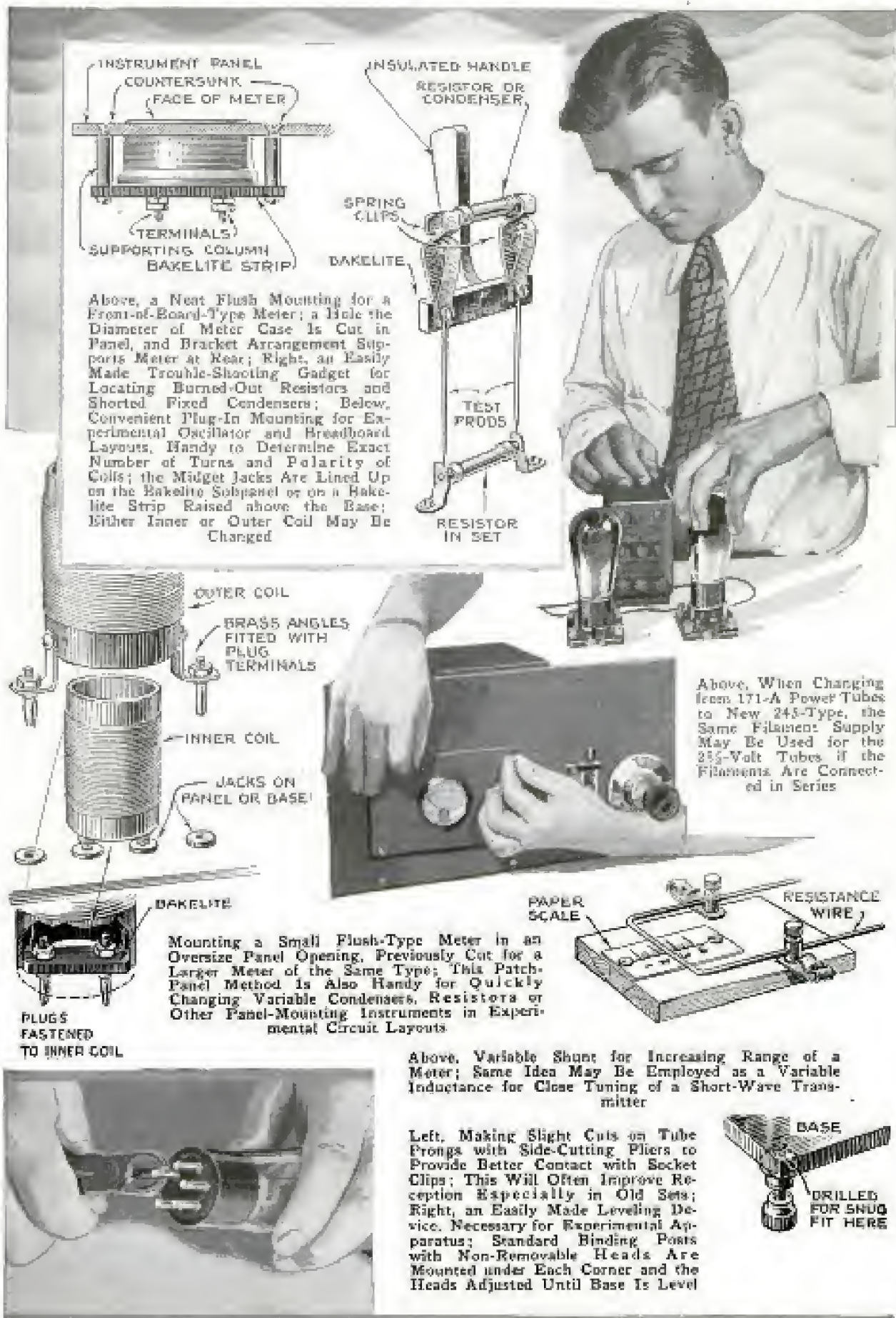
A discarded clockcase of any type similar to that shown in the photo can be used to house a small cone speaker of either the dynamic or magnetic type. Unmounted speaker units may be obtained at comparatively low prices, and many attics and store-rooms contain old clock-cases that will



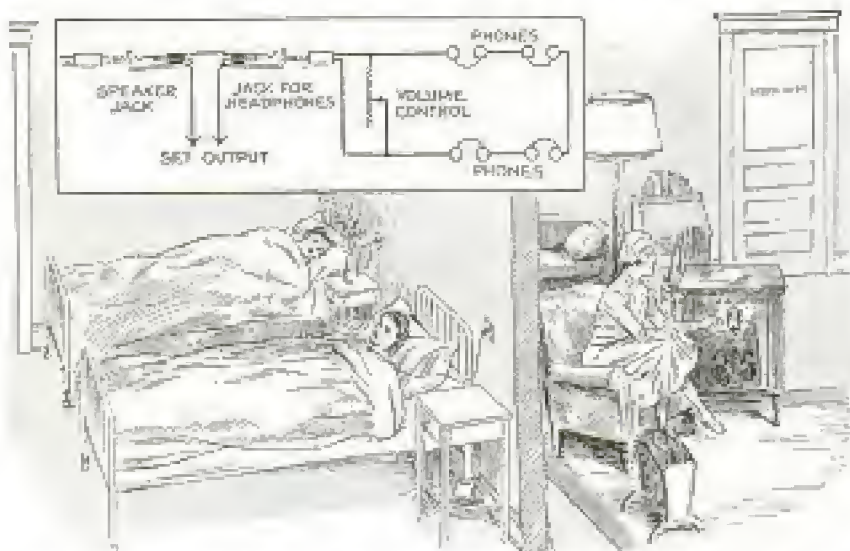
make neat housings.—W. J. Ross, St. Johns, Newfoundland.



## SIMPLIFIED ANSWERS TO YOUR RADIO PROBLEMS







Headphones Extended to Adjoining Room, and Simplified Diagram of the Necessary Connections

### Volume Control for Remote Phones

Where headphones are extended to other rooms, as in hospitals and sanitariums, it is often desirable to operate a loud speaker in a recreation room from the same source. To do this, it is necessary to provide some means for cutting off the phones while the speaker is left on, and to reverse this operation as well as to control the volume in the headphones without changing the volume of the loud speaker. All this is easily done by the method shown in the diagram. Two two-circuit jacks, two phone plugs and a 10,000-ohm variable resistance are required. The jacks and resistor are mounted on a piece of bakelite fastened to the rear of the receiver. The lower prong of each jack is connected directly to the plug-sleeve contact. The volume control may be placed across the phone circuit at any remote point, independent of the jack mounting on the set, if desired. In this manner, a patient or nurse may adjust the volume of the phones without disturbing the speaker volume or returning to the set.—G. A. Thompson, Edgewater, Colo.

### Trouble Light for Battery Sets

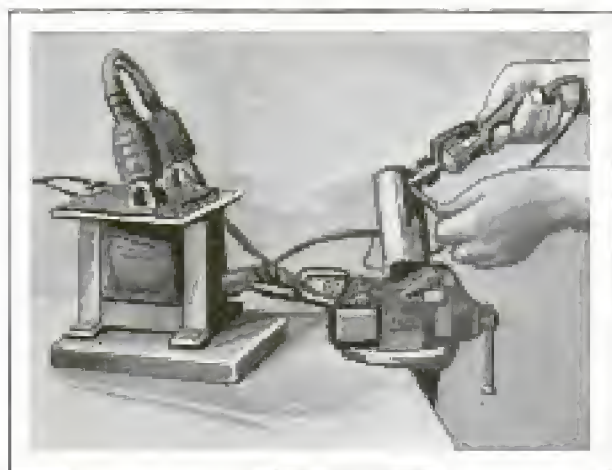
An ordinary panel light and socket may be permanently mounted inside the cabinet at any convenient point where it will be found quite handy when it becomes necessary to change tubes or look for trouble. Leads may be run from the A-battery binding posts and a small switch

placed in one side of the line, or flexible leads terminating in small spring clips will do.—C. Felstead, Los Angeles.

### Soldering of Coil and Stage Shields

Sheet-metal soldering, necessary in making your own radio shields, often taxes even the largest irons to full capacity. It may be done much easier, however, by the carbon-and-transformer method illustrated. An old 5-amp. charger transformer or

any large transformer with a 110-volt primary will answer. The secondary is removed by pulling out the laminations, after which the secondary is rewound with about 15 ft. of No. 10 d.c.c. wire. The instrument is then mounted on a board and the secondary wires run to lugs on an insulated strip. Two heavy insulated stranded wires are then run to the secondary lugs, these leads terminating in large clamps. Altered in this manner, the transformer should have a capacity of not less than 150 watts, and the secondary should supply about 4 volts. Suitable carbons may be obtained from old B-batteries, and the shorter the carbon, the greater



Soldering a Copper Tube Shield by Carbon-and-Transformer Method

the heat. One of the clamps is fastened to the piece to be soldered and the other, holding the carbon, is touched to the metal near where the solder and flux is applied.—John J. Nothelfer, Trenton, N. J.



# SHORT-WAVE SET

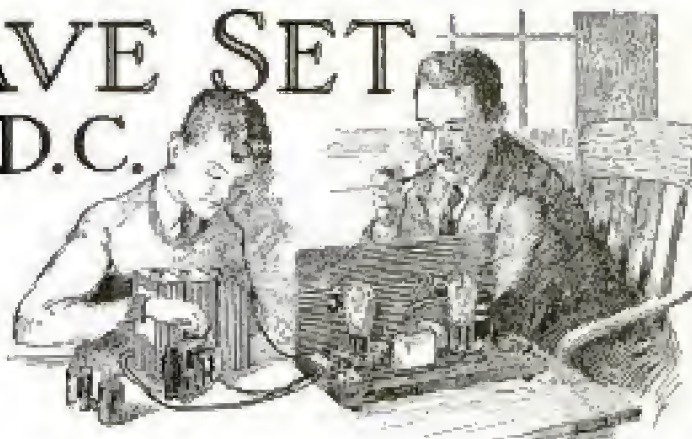
*works on A.C. or D.C.*

by G. I. HENRY

**A**N EXPENSIVE radio set is not necessary for the reception of short-wave broadcasts now available from stations located all over the world. Commercial programs, amateur phone and code offer the experimenter an interesting field in the wave bands below 100 meters.

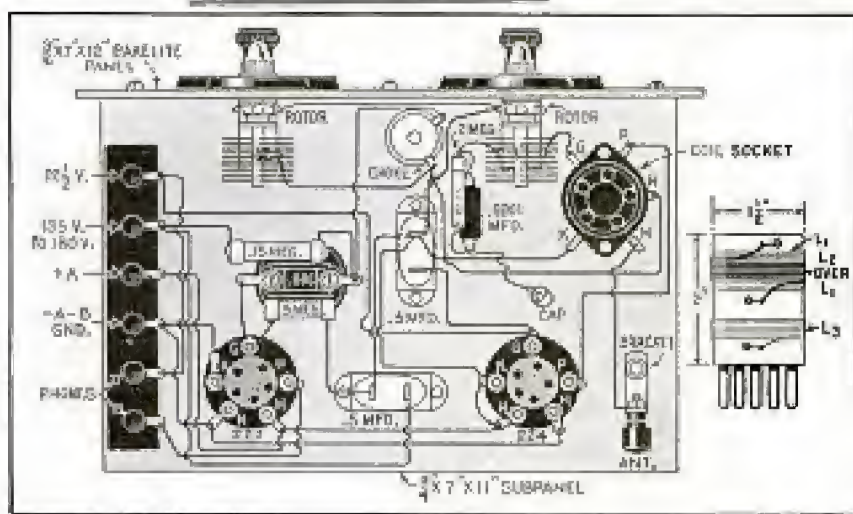
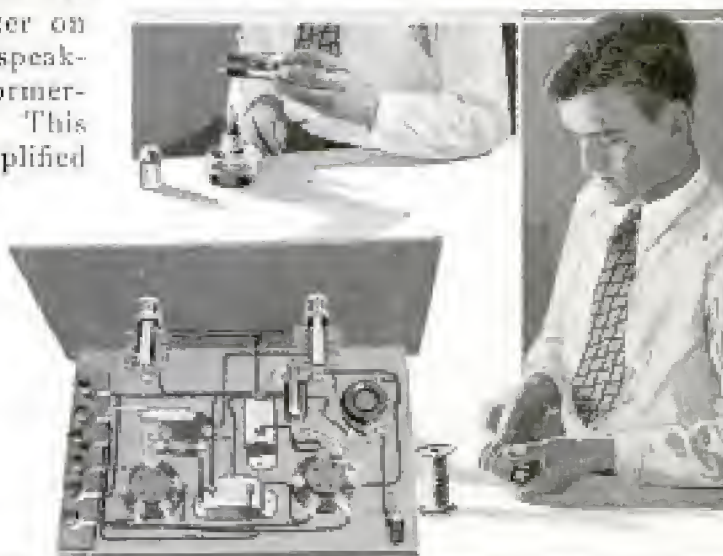
The compact short-wave receiver described in this article is designed for beginners, but advanced amateurs will also find it interesting. A type-224 screen-grid tube is used as an autodyne detector, and a 227-tube as an amplifier in a resistance-coupled audio stage. This will provide volume enough to operate a speaker on strong signals, although for general speaker operation an additional transformer-coupled stage is recommended. This added stage is shown in both simplified and schematic form on page 1005.

If alternating current is used to heat the filaments, the voltage must not exceed  $2\frac{1}{2}$  volts for the first two tubes. An additional 5-volt transformer is used for the second audio stage, or the builder may confine himself to a single transformer combining both secondary voltages as desired. If battery operation is preferred, it can be obtained in either of two ways: The tube heaters may be connected in series with a 6-ohm rheostat if a 6-volt storage battery is used, or, the new 2-volt tubes may be employed with one of the new 2-volt air cell A-batteries. In this case, a type-232 screen-grid tube is used for the detector and two of the type-230 tubes in the first and second audio stages with all tube filaments in parallel.



In battery operation, it has been found desirable to leave "K" disconnected, but it is advisable to try both ways to determine which causes the least hum in your receiver.

Either B-batteries or B-eliminator may be used and the total B-voltage should be about 180, although the set will operate on 135 volts with reduced efficiency. The







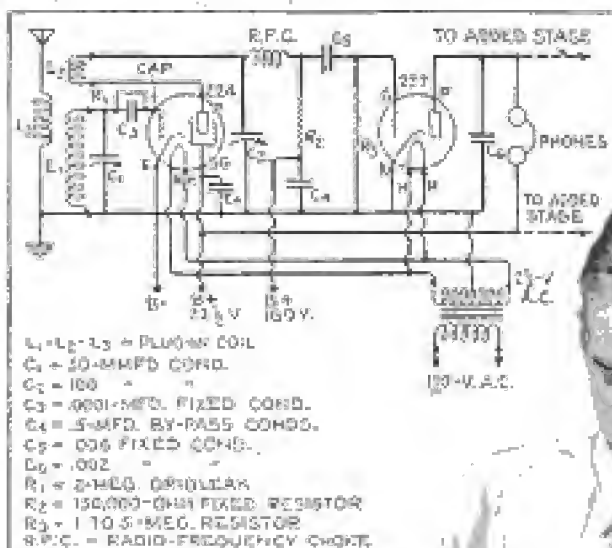
high plate voltage is necessary on account of the high resistance in the plate circuit of the detector tube. Any B-eliminator will cause hum in a short-wave set unless it is exceptionally good.

The set, as shown in the photo and simplified diagram on page 1003, employs standard parts but the plug-in coils, for the 20, 40 and 80-meter wave bands, are homemade. These three coils are all wound on bakelite tubing,  $1\frac{1}{2}$  in. in diameter and 2 in. long. The tubing should have a  $\frac{1}{16}$ -in. wall so that it will fit over the base of a discarded five-prong tube. Three burned-out tubes of this type can be obtained from any radio dealer and the bakelite bases removed either by heating over a flame, as shown in the upper photo on page 1003, or by placing them in a pan of hot water. After removing the glass bulbs from the bases, the wires are clipped and removed from the prongs with the aid of a soldering iron. Clean out all solder in the prongs by blowing through the base while holding the iron on the prong.

The bases are then coated with shellac and inserted in one end of the bakelite tube and put aside to dry. Number 26 d.c.c. wire is used for all coils. It will be noted that there are three windings on each coil, designated as  $L_1$ ,  $L_2$  and  $L_3$ , and their positions on the coil form are clearly shown in the sketch at the right in the simplified wiring diagram on page 1003. Before winding the coils, insert the plug-in

form in the coil socket in the set and note carefully which prong goes into each hole. The bottom of the coil base should be marked accordingly so that the coil leads will be brought down to the proper prongs. Note that coil  $L_2$  is wound over coil  $L_1$ . The number of turns on the tickler coil  $L_2$  will vary with different sets and is best determined by experiment. When winding the coils, it was found that No. 26 enameled wire could be

used to advantage for  $L_1$ . A thin coating of collodion was applied to this coil



and coil  $L_2$  was wound over  $L_1$  before the collodion set. The coils may be separated, however, with a narrow strip of waxed paper if preferred, and d.c.c. wire used for both. Small holes are drilled in the side of the form for the purpose of anchoring the coils, and the leads are taken down through the hollow tube prongs and soldered at the ends in the usual manner. In determining the number of turns for  $L_2$ , if the set oscillates too freely and a whistle is heard in the phones, take off one turn at a time until the whistling stops and the set slips in and out of oscillation with a slight hiss when the regeneration condenser

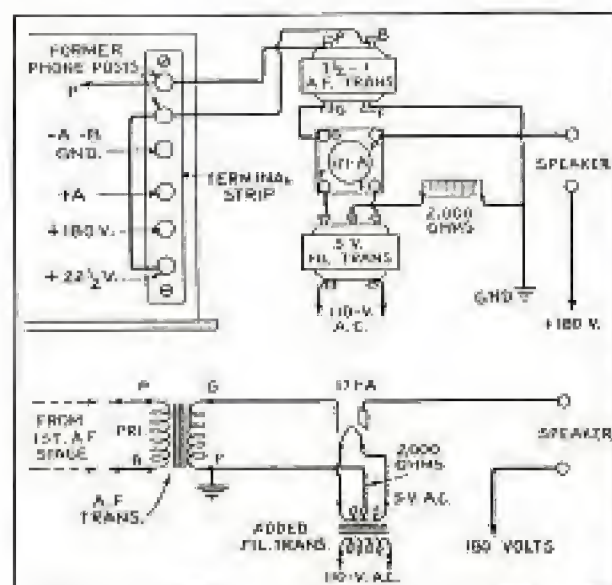


C<sub>2</sub> is rotated. If the set does not oscillate, add a few turns to L<sub>2</sub>. Wind all coils in the same direction. If the receiver refuses to oscillate when the antenna is connected, reduce the coupling by using less turns in the antenna coil L<sub>a</sub>.

The coil L<sub>3</sub> consists of 6 turns on all three of the plug-in coils. L<sub>1</sub> should have 35 turns for 80 meters; 15 turns for 40 meters and 6 turns for 20 meters. Coil L<sub>2</sub> should have 15 turns for 80 meters; 9 turns for 40 meters and 6 turns for 20 meters.

The radio-frequency choke may be a 250-millihenry short-wave type, or it may be made by winding about 200 turns of No. 32 d.c.c. magnet wire on a wooden dowel rod, 1/2 in. in diameter. The commercial type, however, will give the best results over a wider frequency range. A filament switch may be mounted on the front panel if the set is to be battery-operated; if transformers are used, as shown, the set will be controlled by the switch at the light socket.

Simplified wiring diagrams and material list are available to those who wish them; it will be noted that the center tap of the 2 1/2-volt transformer is connected to the ground post of the receiver. The 2,000-ohm resistor in series with the center tap of the 5-volt transformer, in the added-stage diagram, provides the necessary voltage drop to furnish the C-bias for the 171-A tube. The flexibility of this little receiver will appeal to the experimenter, as the circuit may be adapted to make use of many radio parts already on hand.



Rear View of Two-Volt Receiver, Showing the Compact Arrangement of the Various Parts

### Battery Set Uses Two-Volt Tubes

A new battery receiver, designed to operate an average of three hours daily for one year without recharging or replacing batteries, is now available for rural sections and where power lines are not available. The photo shows the panel-lighting batteries at 1; C-bias battery at 2; B-batteries at 3; air-cell A-battery at 4, and the magnetic speaker at 5. The receiver shown on the shelf above, is housed in the shielded units 6 and 7. The circuit consists of three r.f. stages, screen-grid power detector, intermediate a.f. amplifier, and two power tubes in push-pull combination.

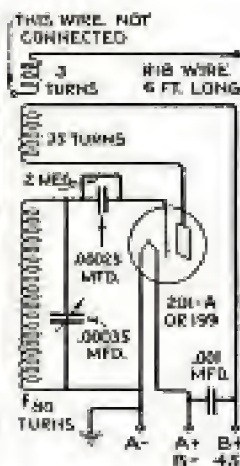
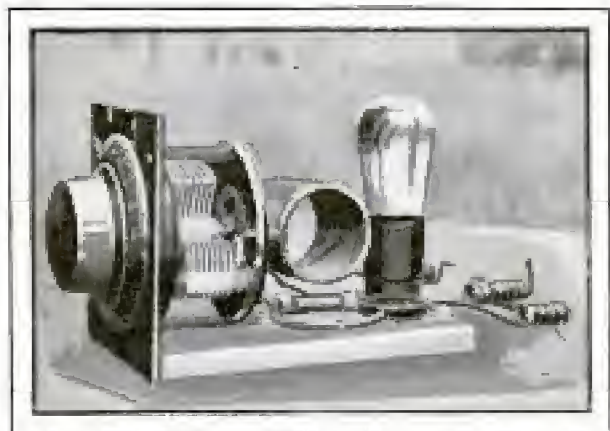
### New Tube Has Line-Voltage Filament

A radio tube, with double tungsten filaments in series, operates directly from the 110-volt current, which may be either direct or alternating. This tube is similar in size to the 245 and will fit into the standard five-prong socket. It may be used either as a detector, r.f. or audio amplifier, and is claimed to have characteristics somewhat like those of the 227-tube in common use. The filaments draw about 12 watts from the unaltered house-lighting supply, and the B-voltages recommended range from 90 to 180 volts.

For further information on any radio construction article write to the radio department; this service is free.

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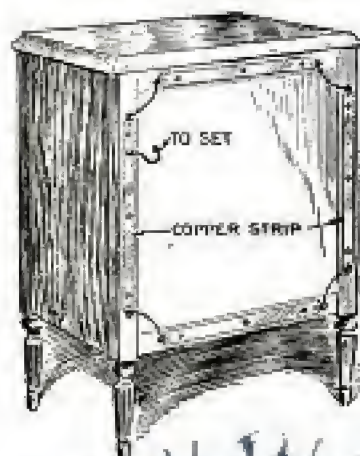


Left, Oscillator Complete, Showing Simple Assembly; Right, Schematic Circuit Diagram

### Experimental Oscillator Easy to Build

While making new hookups and changing my receiver, I found a handy means of keeping an accurate record of distant and local stations by logging them off an oscillator dial instead of on the receiver dials. A station is tuned in on the receiver and the oscillator is tuned to the same wavelength and logged in a notebook. By this method the station is located by dialing the oscillator to the frequency of the desired station and then tuning any receiver to the oscillator. The oscillator should be located about 5 or 10 ft. from the receiver. No. 24 s.c.e. wire is used for the 35 and 80-turn coils which are wound on a cardboard tube, 2 in. in diameter. The separate pick-up coil consists of 3 turns on the end of a 6-ft. wire which is strung in the same manner as an antenna, and should be placed not more than 10 ft. from the receiver.—J. J. Notthelfer, Trenton, N. J.

### Copper Strip as Antenna Substitute



Designed to be attached directly to the rear of the radio cabinet, this antenna substitute, consisting of four copper strips connected in series, is out of sight, and the receiver is ready for

immediate operation when the ground connection is made. This arrangement is said to give good results on modern sets.

### How to Strip Insulation from Magnet Wire

When building small inductances, or wiring a circuit in busbar fashion, the experimenter sometimes requires a length of bare wire. If this is not at hand, it may be prepared by stripping the cotton insulation from the proper-size magnet wire. To remove the insulation quickly, fasten one end of the wire to a nail and rub the insulation with a strip of medium sandpaper. Heavier wire, covered with rubber or fabric insulation, may be rolled into a coil and placed in a fire, and after the insulation has been burned off the wire is brightened with sandpaper.

### Winding Homemade Coils

To make a neat, tight and uniform coil without the aid of a coil winder, use your feet as shown in the photo. Place the spool of wire on the floor and run a piece of rod through it, holding the ends with the feet with just enough pressure to allow the spool to revolve as the coil is wound. The braking action on the spool keeps the wire taut and the result, after a little practice, will be a good looking coil. Anchor the terminals by running the wire through two small holes drilled in the form and coat the finished coil with collodion.—W. W. Kuklmann, Woodcliff-on-Hudson, N. J.



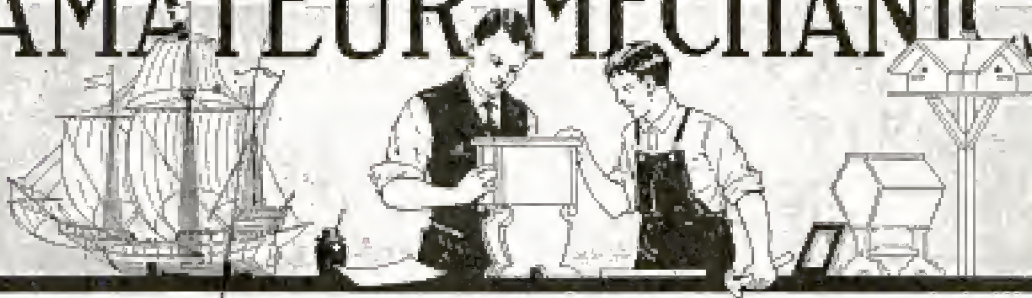
Changing the direction of the antenna will often help to make the receiver tune more sharply.

*James H. Williams Co  
1800 Oak St. St. Louis, Mo.*



*Ford auxiliary water pump  
or circulating pump*

# AMATEUR MECHANICS



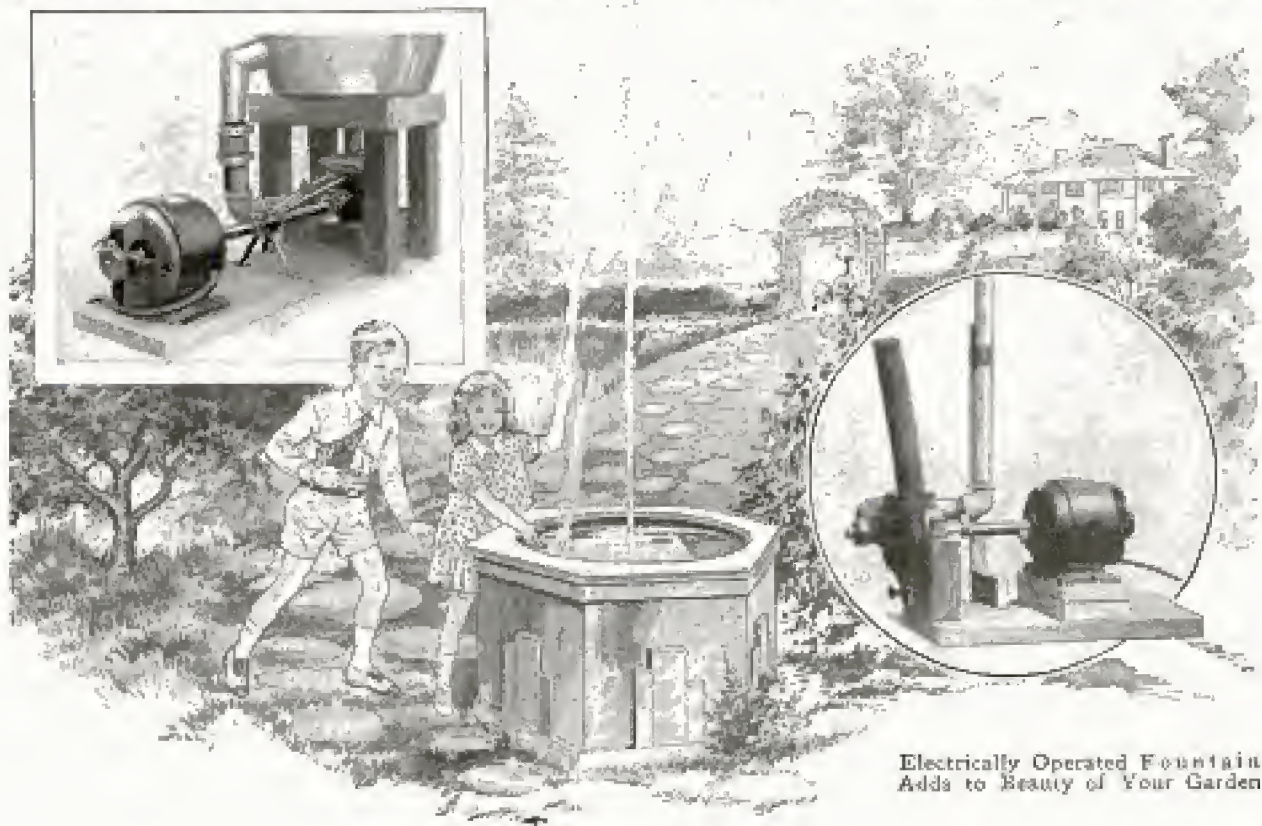
## Electric Fountain Improves the Garden

**T**HIS electric fountain will add greatly to the attractiveness of a garden, make an effective window display where it fits in with the "scenery," will help to put over that pageant or make a miniature golf course more inviting.

A  $\frac{1}{4}$ -hp. motor, a centrifugal pump, a tin dishpan, a few pipe fittings, rubber hose, and other similar items, are all that is needed besides the wood used for the framework. The motor shaft is extended to run the pump, which is set so that a pipe nipple connected to its outlet stands vertically, and the nipple is set snugly in a hardwood block bolted to the pump flange. It is advisable to soak the block in linseed oil for a few days. A rubber gasket is also used between it and the

flange. The threaded end of the pipe projects through a hole cut in the center of the dishpan, and a leather or rubber gasket is used between it and a lock washer run on the pipe. A reducing coupling is then fitted on the pipe, tight against the bottom of the dishpan. Take a piece of tin and form a cone-shaped rim fitting against the edges of the basin, and solder it on. Run a short  $\frac{1}{2}$ -in. nipple into the reducing coupling and screw on a cap, drilled and tapped for a jet made of  $\frac{1}{8}$ -in. brass tubing. Two examples of jets are shown in the upper-left detail. A  $\frac{1}{8}$ -in. jet threw a column of water from 6 to 8 ft. high, while three jets of the same size threw the water up about 4 ft.

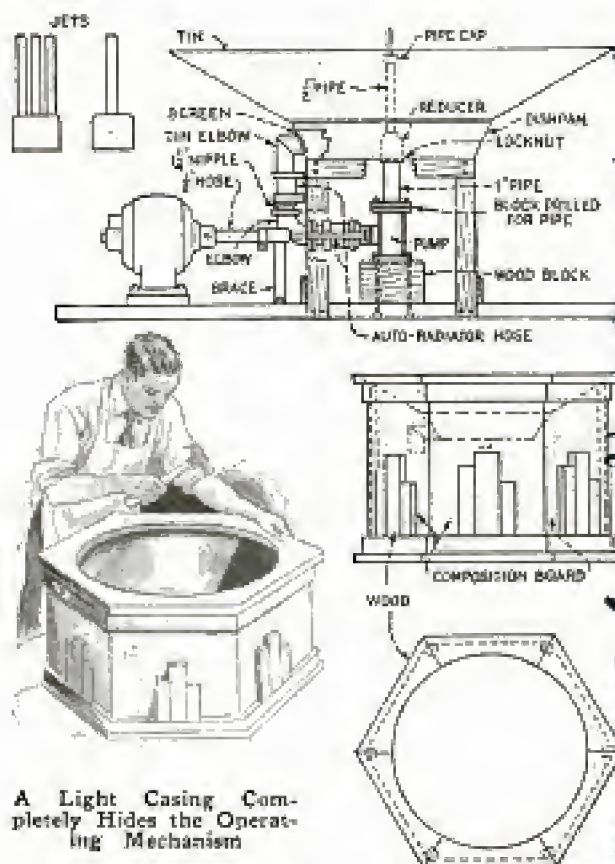
To provide a return for water in the



Electrically Operated Fountain  
Adds to Beauty of Your Garden



## An Amusing Grasshopper Toy

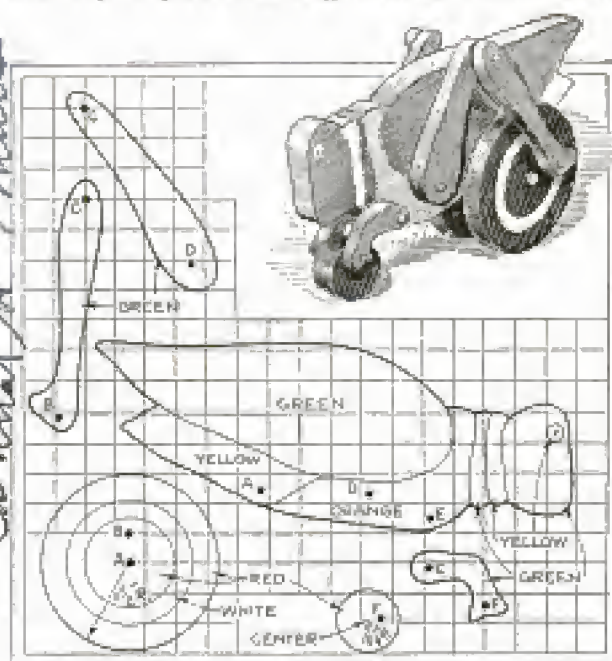


A Light Casing Completely Hides the Operating Mechanism

basin, a hole is cut in the side and a tin elbow soldered on the outside over the hole, while a screen is soldered over the inside to keep out leaves and other trash. Pieces of auto-radiator hose, elbows and pipe fittings bring the return pipe to the intake of the pump. With this arrangement, a constant source of water is supplied which diminishes only on account of the water lost by dropping outside the basin and by evaporation.

The exact type of fountain you wish to build determines the length of the outlet and return pipes connected to the pump, and as you will notice, the two photos show variations in this respect. The outside casing consists of a wooden framework, covered with wood or composition board, all the wood being thoroughly painted to resist the effects of dampness. Another variation is to tack metal lathe to the frame and then cover with cement. Although the covering should be securely anchored, it must be removable to permit access to the fountain mechanism. The entire fountain can be conveniently stored in the basement during the months it is not used. The supply line should be run in underground conduit and this will also accommodate current leads for operation of colored lights which may be added.

It takes only a few minutes of spare time to make a wooden grasshopper that jumps in a realistic way when pulled along the floor. The body and front wheel are cut from stock 1 to 1¼ in. thick, and the other parts from ¾ or ½-in. material. Cut out the parts with a small coping saw to the shape given in the squared portion of the illustration, drill the holes for the joints and axles, sandpaper carefully and then paint or lacquer. Fasten the rear wheels so that they will turn freely, using a No. 7 flat-head wood screw as the axle and placing a washer between the wheel and the body. The front legs are nailed solidly to the body and the front wheel slipped between them, making use of a cotter pin for the axle. Notice that the axle is eccentric to produce a jumping effect. Assemble the hind legs so that they work freely, and pin the feet off center so that they will occupy the same position on both wheels. A cotter pin is used to attach the thighs to the body, while a small screweye is driven into the head to hold a length of string with which the toy is pulled along on the floor. The

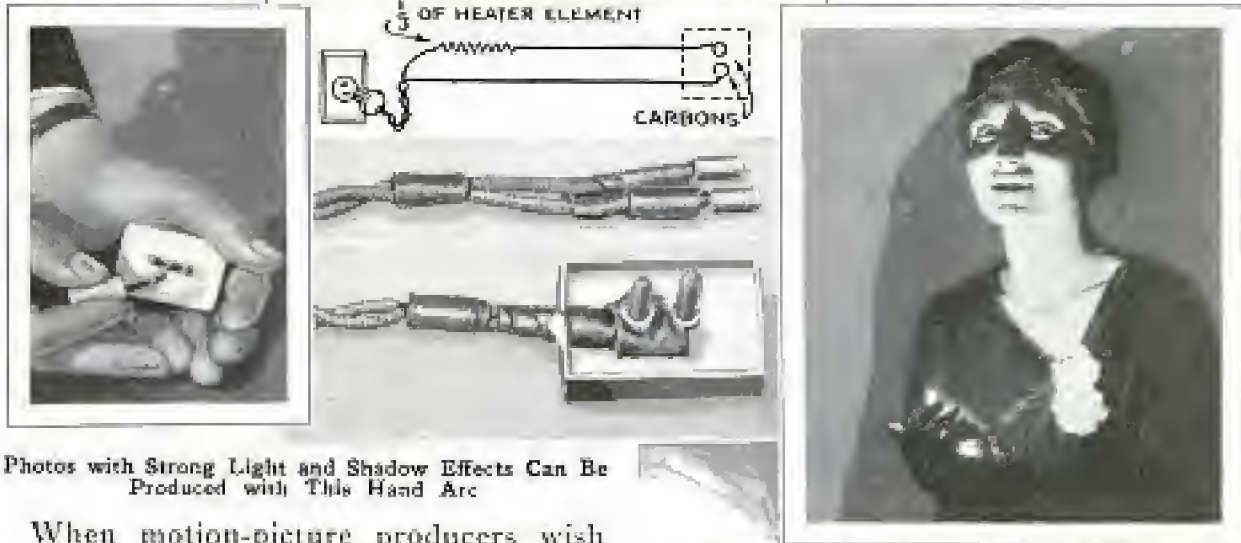


A Wooden Grasshopper That Jumps in a Realistic Manner When Pulled over the Floor

letters show exactly where the various pieces are joined, and a good color scheme that has been found highly attractive is also suggested.—Kenneth R. LaVoy, New Rochelle, N. Y.



## ARC LAMP HELD IN HAND MAKES UNUSUAL PHOTOS



Photos with Strong Light and Shadow Effects Can Be Produced with This Hand Arc

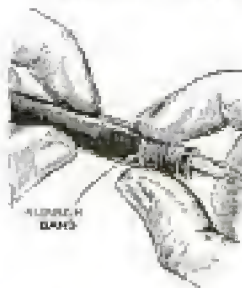
When motion-picture producers wish to show a hero holding a lighted match, they use a tiny arc lamp, concealed in the palm of the hand, as the illumination from an ordinary match would be insufficient. An arc lamp of this type is simple to construct and can be made to plug into a health lamp, or into the house-lighting circuit direct, if a resistance consisting of one-third of a heater element is cut in in one of the lines. A 10-ft. piece of lamp-cord is used. Solder the ends to  $\frac{1}{2}$ -in. lengths of brass tubing just large enough to receive small carbons snugly. These carbons can be obtained from dealers in sun lamps. The connections are wrapped with tape so that the tubes will be spaced about  $\frac{3}{8}$  in. apart. They are fitted into a small cardboard box with the cord extending at one end. Plaster of paris is then poured into the box level with the top, imbedding the tubes securely. Pieces of carbon should be placed in the tubes so that they will not become filled with plaster. To the other end of the wire, similar brass tubes are soldered to fit in the carbon holders of your sun lamp. In the absence of the latter, the ends are connected direct to an electric plug, and a resistance coil is placed in one line, as shown in the diagram. The coil is, of course, mounted on an insulated block. Carbons, from 1 to 2 in. long, are used in the hand lamp. It is lighted by making contact between the carbon ends with a third carbon, insulated with tape at one end. In making photos, the arc should be carefully shielded from the camera lens by holding it in a cupped hand, allowing just the tip of the flame

to be seen. In the case of a small box camera a one-half-second exposure will give good results. With a folding camera having a larger lens, one-fifth or one-tenth-second exposure is sufficient. The cord should be concealed by running it along the length of the arm.

### Water-Soaked Papers Keep Plants Fresh

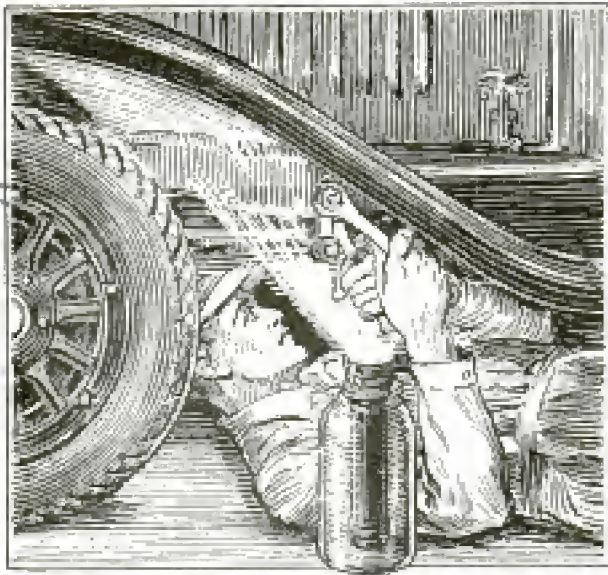
Water-soaked newspapers, covered by several layers of dry papers, will keep ferns or other plants fresh for days. Glazed papers are unsatisfactory because they do not soak up enough water. When camping or traveling where running water is unavailable, water canteens and food containers can be wrapped in a few layers of wet newspapers, which will keep them cool as the evaporation reduces the temperature considerably.

### Rubber Band Helps Unscrew Pen



Unscrewing the point of a fountain pen or removing a small glass stopper from a bottle is sometimes a rather difficult task when the fingers cannot get a good grip. A rubber band, wound tightly around the part to be turned, will be found an effective aid in increasing its bulk and providing a surface that will not slip.—Edwin L. Allen, Auburn, Ind.





Fruit Jar Holds Large Flashlight in Most Convenient Position When Working underneath Car

#### Fruit Jar Holds Flashlight under Car

Those who work under their car occasionally with a flashlight for illumination, will find the use of an ordinary fruit jar quite an aid for holding the flashlight vertically. One autoist carries such a jar along for this purpose in case it is necessary to get under the car while on a trip. In sand or loose dirt, the jar can be set at any convenient angle.—W. F. Heisterman, Chicago.

#### Panel Molding Helps to Make Plain Walls Attractive

Decorative moldings help beautify plain walls and ceilings that are either papered or painted. This method of decoration has come to the fore through the development of ornamental wood, fiber and composition molding, which can be obtained in all styles and sizes at moderate prices. The molding, properly selected, will emphasize the beauty of wallpaper and stippled paint, relieve the severity of plain walls and add



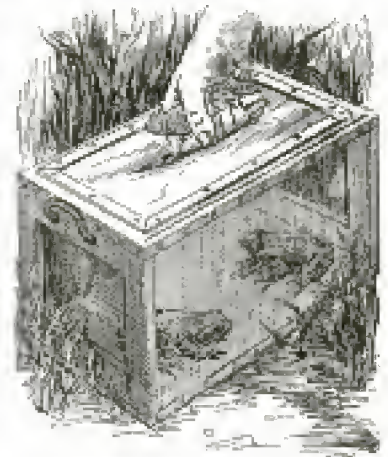
an agreeable finishing touch to any room. Through variation in treatment, either formal or informal effects can be obtained.

#### Tin Cans Trap Pack Rats

When all man-made tricks and traps had failed to catch pack rats, a U. S. forest service lookout resorted to strategy to win the day. He took an empty tin can and cut the top crosswise, dividing it into quarters. The sharp points were then pushed inward, leaving an opening just large enough for the head of a rat. This can was baited with food placed inside. During the night he was awakened by the sound of the can being thumped on the rocks near by. The rat could easily get its head into the can but getting out was another matter. Six more cans, similarly treated, resulted in six more casualties the next night, and in a short time the camp was rid of rats.

#### Frogs Cannot Get Out of This Box

Fishermen will not lose frogs from this box, as the top consists of a piece of inner tube, pulled tight and tacked on. A long slit in the rubber serves to insert or remove the frog.



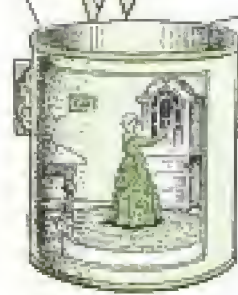
#### Pipe Cleaners Make Good Wicks for Cigar Lighters

Users of pocket cigar lighters may substitute a piece of pipe-stem cleaner for the wick if the latter cannot readily be obtained. The wire inside serves as a needle and makes insertion easy. The stiffness also enables one to set it at the proper distance from the flint. When the striking wheel fills up, use a file brush to clean out the grooves. Do not crowd too much cotton into the lighter for tight packing reduces the amount of fuel that can be stored in the lighter.—Victor A. Stewart, New York.

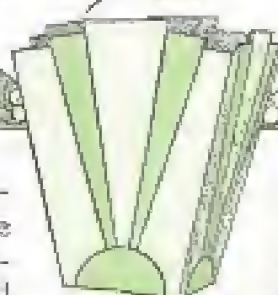
Suggested by Wm. Woodrow Moulding Co. 418 N. Leavitt, Chicago, Ill. 60 Collage Paper Kling Mfg. Co. Danie Kabaner Co. 1000



# Waste-Paper Baskets de Luxe



UNTIL recently, the lowly waste-paper basket had



ordinary hand spray. This basket will cost you about 35 cents



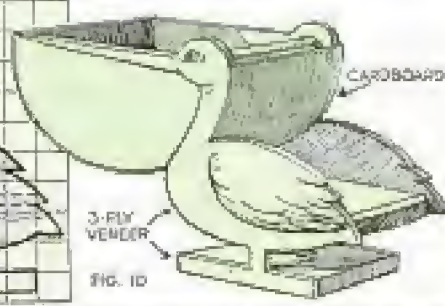
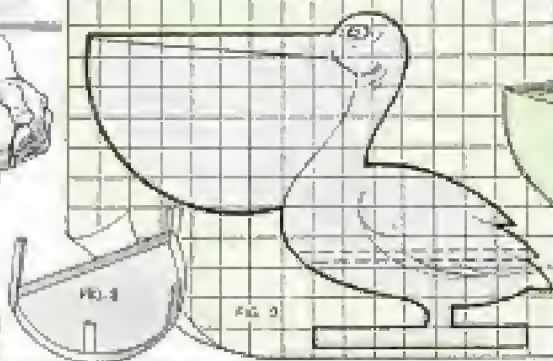
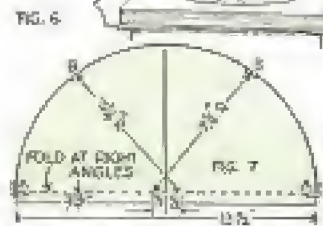
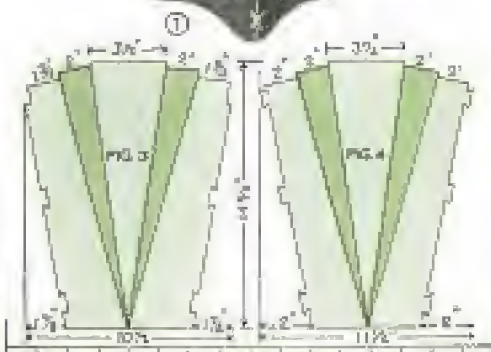
but one point in its favor; it is practical. Today, however, these baskets are made in many shapes, attractive colors and novel designs, to serve also the purpose of decoration.

A neat three-cornered basket is shown in Fig. 1. It consists of three pieces of composition board, cut to suitable size. Drill a row of  $\frac{3}{16}$ -in. holes along two edges as indicated. Fasten them with small brads to a triangular base of 1-in. stock, about 1 in. above the bottom, and lace the edges together with ribbon. Photos or other pictures can be pasted on the sides. Put a border around each picture and finish the basket by spraying it with clear lacquer, using an

and will scarcely take you an hour's work.

To make a four-sided basket of modernistic design, cut two pieces of composition board to the shape and dimensions given in Fig. 3, and two pieces like Fig. 4. The lugs and notches serve to join adjacent sides together, a process quite obvious once you get the pieces in your hands. After the four sides are assembled, the square bottom of 1-in. stock is slipped into the basket from the top and is bradded in place. This basket looks best painted. You can readily see, from the headpiece, how the various "rays" can be carried out in different colors.

For something entirely different, try the "pelican" basket shown in Figs. 9 and 10.







Besides being a waste container, it also serves as a book rack. The base consists of a block of 1-in. yellow pine, 7 in. wide and 10 in. long, with the center cut out and filled with melted babbitt or linotype metal, obtainable at a print shop, as shown in Fig. 6. The inside edge of the cut-out should be studded with nails to anchor the metal. After the metal has cooled, nail a strip of thin wood or composition board over the top and heavy felt over the bottom. Cut two sides to the shape shown in Fig. 9, from three-ply veneer.

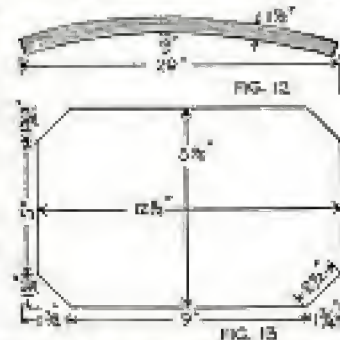
The drawing is easy to reproduce in larger sizes as it is laid out in squares. Nail the sides to the ends of the base as the latter alone will not hold the sides together. A second crosspiece, serving as a bookshelf, is nailed in place, and a length of  $\frac{1}{2}$ -in.owel rod connects both side-pieces at about the center of the head, holes being drilled for the rod, which is then glued in place. The pelican's pouch, which is the waste-basket portion, must

be closed on the underside with a long strip of heavy cardboard, nailed to the edge of the bill. Use light strips of wood to bind



the top edges of the cardboard pouch.

Oval baskets, with coverings of parchment, cloth, decorative papers and rare prints, are no more difficult to make than any of the apparently simpler square and rectangular baskets. Cut from composition board an oval of the size and shape shown in Fig. 15 to form the bottom. A long piece of cardboard, about  $11\frac{1}{2}$  in. wide, which will bend without cracking, is curved around it to form the side. The joining edges of the side are held together with strips of gummed tape. A second piece of cardboard is similarly shaped around the first, the joint of this piece being placed opposite the joint on the first. Then coat the inside of the basket with paste, after which a third piece of cardboard, preferably colored, is slipped in, pushing the bottom of the basket down to the required position about  $\frac{1}{2}$  in. from the floor level. The inner piece should therefore be  $\frac{1}{2}$  in. less in width than the outer pieces. A narrow strip of cardboard is glued on the inside, below the bottom, to hold it in place. The outside covering for the basket can be almost anything in the way of fabrics or paper. If the basket is to be used for a bedroom, colorful wallpaper or cretonne is the logical choice; for a kitchen, oilcloth or washable paper should be used; for the living room, parchment, velvet, plain paper with prints, or smalt. Smalt is simply colored glass ground to small particles. The basket is coated with heavy paint and the smalt then dusted over the wet surface. Fig. 16 shows an oval basket covered with oilcloth and having a decorative flower, also of oilcloth, on the facing side, while strips of contrasting color are used for trimming the edges. Cut the strips on a long curve, Fig. 12, so they won't crinkle when applied to the edges.





The octagon basket, shown in Figs. 2 and 11, consists of eight pieces of composition board or heavy cardboard, each piece 12 in. long. Four of them are 2½ in. wide; two, 5 in. wide, and two, 9 in. They are arranged side by side on a table, as shown in Fig. 14, and the joining edges fastened together with gummed tape. A block of wood, shaped as shown in Fig. 13, forms the bottom, and the sides are tacked on. Gummed tape is again used in fastening all joining edges, as shown in Fig. 11, after which wallpaper is applied to the outside. The inside is covered with plain colored paper to match. Red gummed tape serves for finishing the bottom and top edges.



The basket shown at the right-hand side of the headpiece is made of brass, copper or galvanized sheet iron and wire screen. Cut out and bend the base as shown in Fig. 7. The straight edge is turned up at right angles ¼ in. A strip of metal, ¼ in. wide, is soldered around the curved portion to carry this edge entirely around the base. Uprights for the basket framework are four strips, each 1½ in. wide and 12 in. long. Two of these are bent at right angles lengthwise and are soldered into the two corners of the base, as shown in Fig. 8. The other two strips are soldered to the curved base strip. A ¼-in. strip is used to tie the uprights together at the top as shown in Fig. 5. The framework is covered with No. 48 brass screen with the edges brought to one of the rear corners and soldered neatly. A 1-in. strip of No. 16 sheet copper binds the bottom of the basket, and a similar strip, with the edge turned down ¼ in. to form a channel, is slipped over the top edge. Both strips are soldered or riveted in place. The basket is not really complete without a silhouette of some kind to ornament the front. This may be cut from sheet copper, bent slightly to conform to the curvature of the basket, and is held by drops of solder applied from the inside through the screen.



Emergency Water Bucket for Campers and Motorists Can Be Made from Old Inner Tube

#### Inner Tube Forms Water Bucket for the Motorist

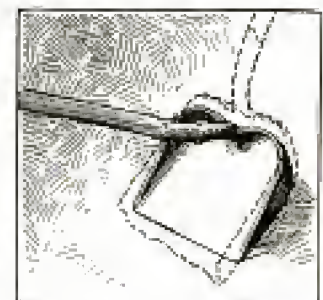
An old inner tube, cut in two at the valve, provides a handy emergency water bucket. After filling it, squeeze both ends together. It will hold about 2 to 3 gal. of water.—Kenneth Manning, Lemoor, Calif.

#### Iron Rust Improves Rose Bushes

Rose bushes, which have been planted in apparently fertile soil and have been given the best of care, and yet show a fragile appearance, do not get enough iron from the soil. By placing iron rust around the roots in the fall of the year, it will be in such a state of decomposition by the following spring as to furnish the much needed iron which makes the rose bushes grow healthy and sturdy.

#### Garden Hoe Made from Old Shovel

When a shovel is so worn that it cannot be used for its original purpose, bend the blade over to form a hoe, which will be serviceable in the garden. The metal blade should

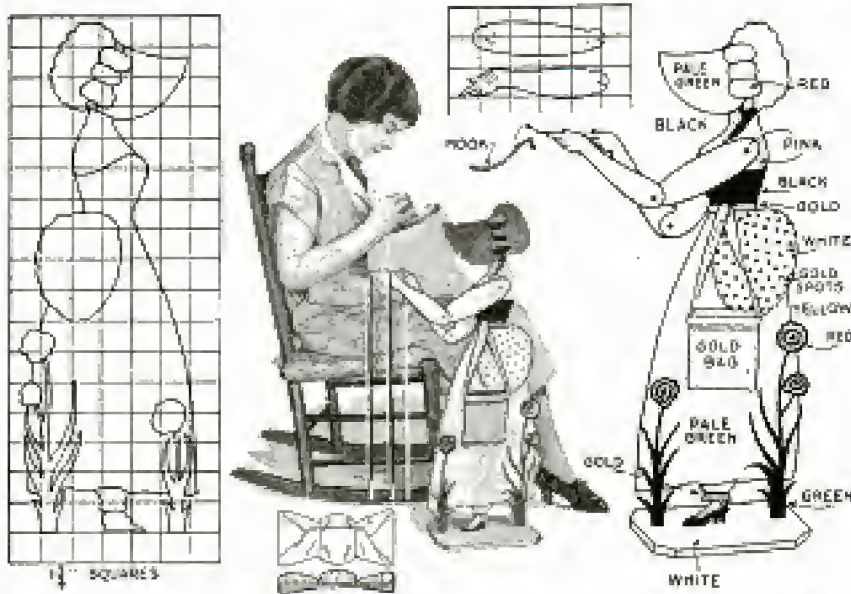


be heated to a dull red so that it will bend easily, and, of course, the handle should be removed while this is done.

Soiled leather can be cleaned without injury by rubbing it with a sponge dipped in a saturated solution of oxalic acid and warm water.



## THIS COLONIAL MAID HOLDS YOUR SEWING THREAD



The Arms Are Pivoted to Hold Thread at Convenient Height, and a Bag Is Provided for Spools, Needles, Thimbles, and Other Materials

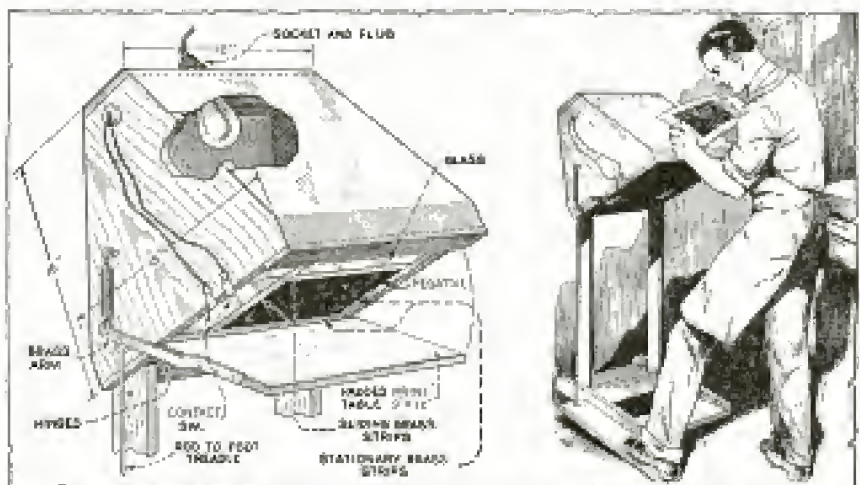
To hold your thread and yarn, and other sewing supplies the ornamental colonial maid shown here will be found to be of

considerable utility. The body is cut from a suitable piece of plywood and is mounted on a base measuring about 8 by 12 in. The arms, also cut from plywood, are pivoted at the elbows and shoulders so that they can be adjusted to any convenient height. Wire hooks, attached to the forefingers, serve to hold the thread. If desired, a bag can also be provided on one side for spools of thread and other sewing material, while a hook on the other side holds a couple of hoops. Although the colors suggested in the right-hand detail have been found especially fitting, any variation may be followed.

## A Photo Printer for Fast Work

With this photo printer the actual exposing is done by pressing the foot pedal, leaving the hands free to prepare the next paper to be exposed. For this reason about twice as many prints can be made with it in a given time as is possible with the usual type of box printer. The ends of the box are made of 1-in. wood and wooden rails 12 in. long are nailed across them. The top, back and bottom are made from a single piece of sheet iron bent over as shown in the drawing. The front consists of a 9 by 12-in. print table, which swings down, being hinged to a 4-in. strip nailed across the bottom of the front, while a 2-in. strip is provided across the top above the print table. The opening between these strips is covered with a piece of glass cut to fit. The legs, which should be 30 in. long, are made of two pieces of 1 by 3-in. lumber. They pass up inside of the back of the

printer and are screwed to the inside of the two endpieces. A base to which the legs are attached is also made of 1-in. stock, with feet 24 in. long. A foot pedal is made from a light piece of 4-in. wood about 15 in. long. To the left-hand edge of the print table screw a strip of brass with one end projecting back about 5 in. A wire rod connects the pedal to the brass strip as indicated, and a coil spring keeps the table in an open position when not in use. Negatives are held in place against the glass by means of four thin brass strips, two of which are fastened down



Foot-Operated Printer Leaves Both Hands Free, Making for Quick Work

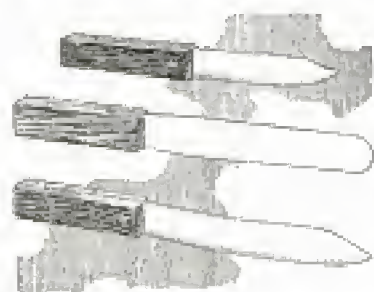


securely while the other two are movable to permit adjustment for negatives of different sizes. The upper surface of the print table should be padded with 3 or 4 thicknesses of soft cloth. Install a standard light socket in the position shown and provide an extension cord for attachment to a wall plug. One wire of the cord is cut and the two cords are connected to two brass contacts located on the left-hand end piece so that the brass strip on the edge of the table makes connection with them when the table is closed.—R. E. Deering, Clements, Kans.

### Knives from Phonograph Springs

Keen-edged kitchen knives can be made from old phonograph springs, which are just of the right temper for cutlery. Use a pair of tin snips to cut off pieces from the springs and grind them down to the desired shape. The handle consists of

two pieces of hardwood riveted together with the blade between them. The portion of the blade fitting in the handle must be annealed



by heating it to a cherry red and cooling slowly, before the rivet holes can be drilled. The edge should not be ground and honed until all other work has been completed.

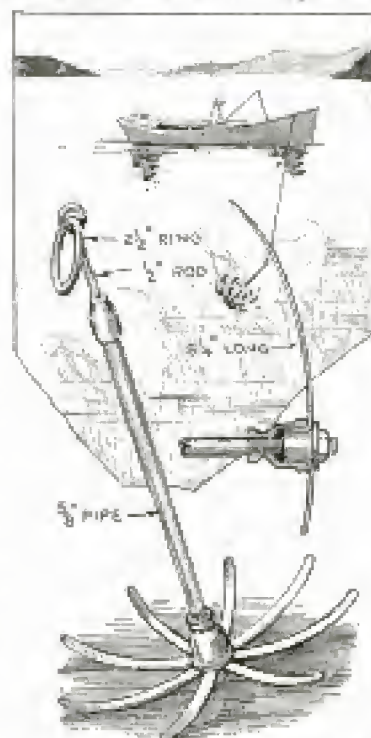
### Birdhouse Adapted to Accommodate Larger or Smaller Guests

Those who have birdhouses with entrances designed to accommodate large birds, can easily provide a door which will allow access to small birds but keep out the larger ones. A disk of  $\frac{1}{4}$ -in. wood, a little larger than the size of the present entrance, and having a smaller hole drilled through the center, is pivoted over the entrance by means of a screw so that it can be swung out of the way. A  $\frac{3}{4}$ -in. hole in the disk is about the right size for wrens. If desired, the disk can be made large enough to cover a handhole, so that the birdhouse can be cleaned out at the end of the nesting season.

### Collapsible Anchor Can Be Stowed in Small Space

For those who have to carry their boating equipment in the car, a collapsible anchor, which stows under the back seat, will be found convenient. It consists of

8 pieces of flat iron,  $8\frac{1}{2}$  in. long, with one end bent over at right angles and having a gradual curve toward the other end. A length of  $\frac{3}{8}$ -in. pipe is fitted with a reducing coupling, into which a  $\frac{1}{2}$ -in. rod, provided



with an eye and a ring, is screwed. Another coupling at the lower end accommodates the bent ends of the blades which are securely held in position by means of a sleeve, washer and nut.

### Split Stopper Holds Milk Tickets

As a holder for milk tickets that prevents them from blowing away, a split wooden stopper, tapered to fit the mouth of a milk bottle, will be found practical. In use, the ticket is placed between the two parts, and the stopper is then pushed tightly into the bottle.

It also keeps the ticket out of the bottle and consequently the not uncommon trouble encountered by having the tickets frozen to the bottom, will be entirely done away with.



☛ Benzine will remove chewing gum from rugs or clothing.





Lightening the Task of Loading Heavy Cans on Trucks by Providing a Sliding Side Door

### Side Door in Truck Makes Loading Easy

A small door in the side of a truck body is convenient for loading heavy objects, such as milk cans, etc. Cut out a section between two uprights and nail the cut-out section together, after which it is slid between cleats provided on both sides. A handle on the door will also be found convenient. If desired, the door can be hinged and held closed with a hasp.

### Notches Cut in Violin Bridge Increase Volume

Filing notches in the bridge of a violin between the strings, as shown in the illustration, has been found an effective method of increasing the volume and clarity of tone. This trick will eliminate the



"nasal" quality characteristic of many cheaper-grade violins. Take an ordinary round file, the teeth of which are not too coarse, and cut the grooves carefully so that the bridge will not be cracked. The effect of such notches is just the opposite to that of a mute.—Henri Geo. Constillae, Jr., North Braddock, Pa.

### Curing Auto of Shimmying.

There are several things that any automobile owner can do to eliminate shimmy or front-wheel wobble. The most common causes of shimmy are excessive looseness of the steering-gear parts, soft or unequally inflated tires, unequally adjusted front shock absorbers, or unbalanced wheels. A blow-out patch in a tire is sufficient to cause a shimmy, and is, in fact, frequently the cause. If the front wheels tend to settle at any particular point when they are jacked up to be tested for balance, a little wire solder wound and taped around the spoke on the high side will bring them into balance.

### Clip on Graflex Focusing Knob Aids Quick Action

Quickness of focusing is largely responsible for good pictures shot on the spur of the moment. Straighten out a paper clip and twist it tightly around the shank of the focusing knob with a pair of pliers; then bend it over the knurled edge at the point which is uppermost when the camera is opened. This will enable you to bring the lens in focus with a slight movement of the thumb and finger, and eliminates the necessity of opening the camera hood. You will soon become accustomed to the "feel," so that an exact focus can be quickly determined and you can catch the "now or never" pictures.

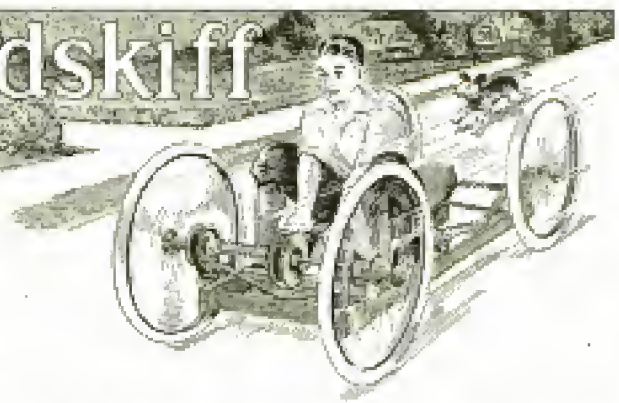


### Homemade Floor-Crack Filler

A good filler for floor cracks caused by shrinkage can be made from plaster-of-paris, whiting, varnish, linseed oil and drier. Take equal quantities of the first two and mix them in enough varnish to make a thick puttylike mass. Add a small quantity of oil and drier, and the filler is ready for use. Press it down into the cracks. When dry, it will be very hard and may require some sanding. It will not shrink and will not check out.—B. M. Beeman, Detroit, Mich.



# A Flying Landskiff for Thrills



**S**URPRISING speed can be attained with this hand-power landskiff because nearly every muscle of the body is used in propelling it. The action is very similar to that of an oarsman in a racing shell, in which the seat slides back and forth, permitting use of the legs as well as the arms and back. It is an excellent exerciser and provides excitement and thrills as you gain speed on a smooth highway. Although some machine work is necessary in its construction, the pleasure derived from it more than balances the trouble and expense of building.

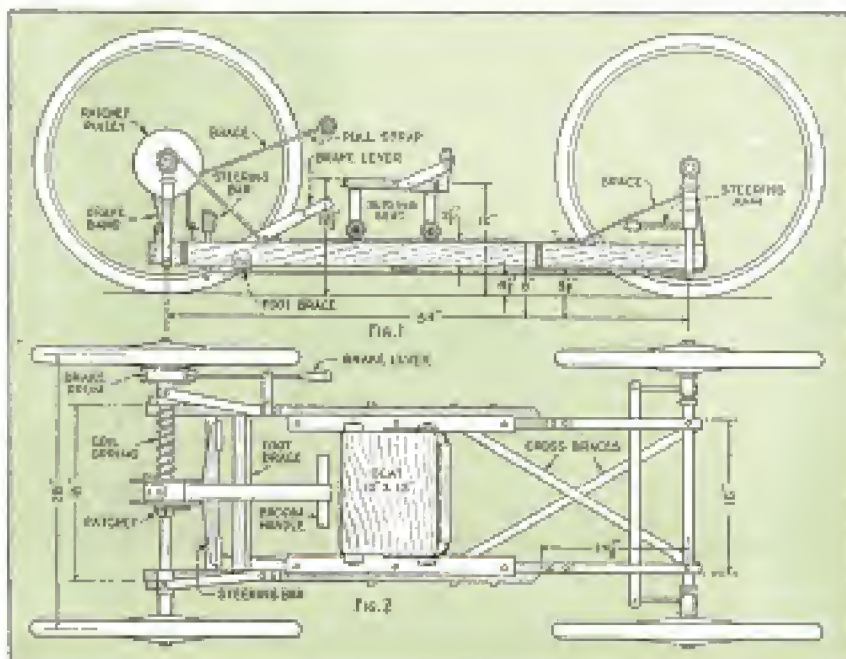
First of all you will need four standard rear bicycle wheels, 28 in. in diameter, and as none of the brake mechanism, spindles, cones or ball bearings are required, the wheels can be picked up at a cycle shop for a small price. The original spindles and bearings cannot be used because the former are of too small a diameter to support the load without the use of a fork. New spindles of suitable size, to fit crank-hanger cones and ball bearings, must be turned out by a machinist.

Before beginning construction on the framework, study the side view, Fig. 1,

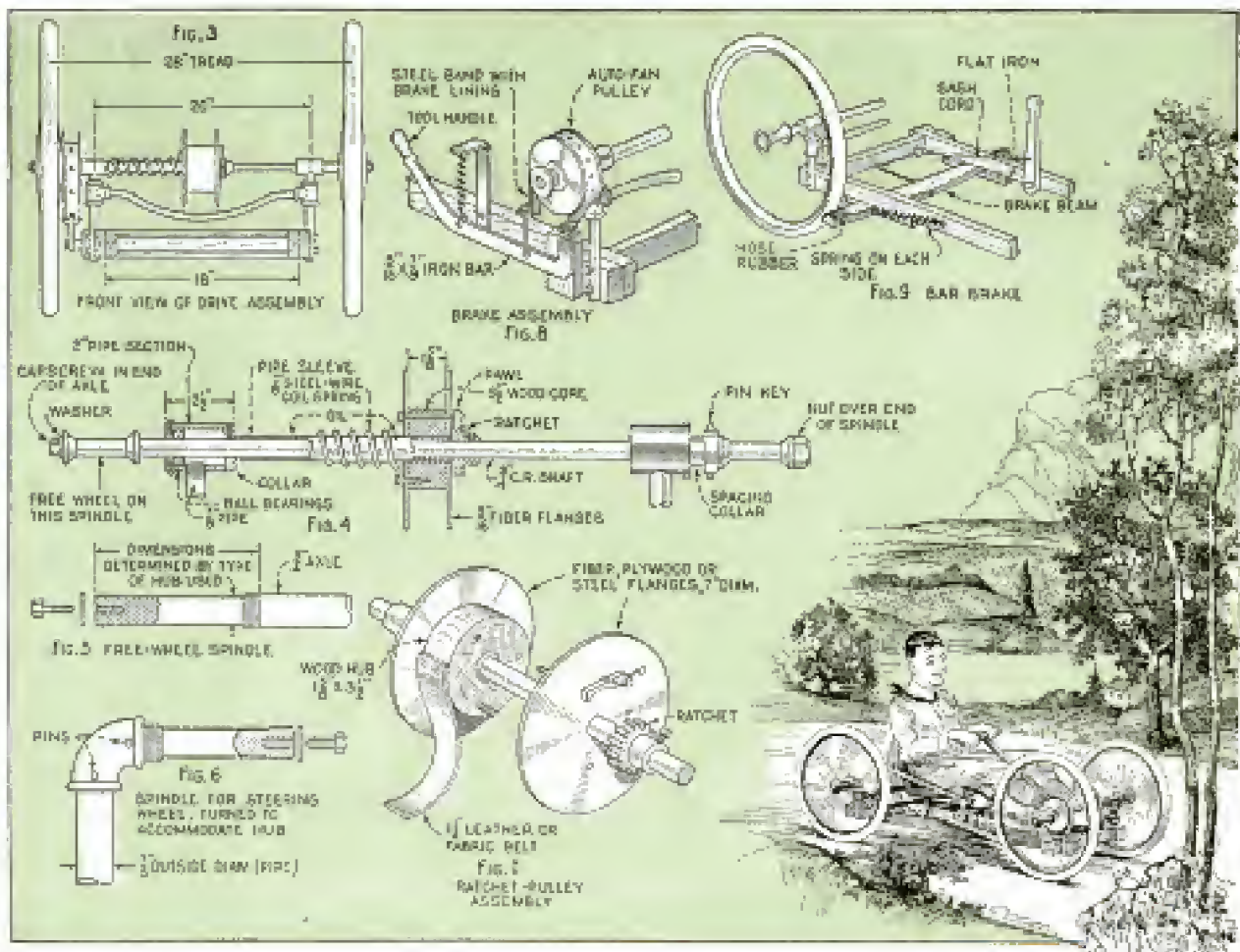
and the plan, Fig. 2. Note that the seat is only 12 in. above the roadway, and the rear wheels are used for steering. The main frame is made of 1 by 2½-in. pine or other wood of equal strength and lightness, reinforced at the ends with pipe and fittings, which also carry the axle bearings. The perspective view, in Figs. 14 and 17, will help to make the assembly clear. The side members of the frame are lap-jointed 14½ in. from the center line of the rear wheels. The purpose is to give more clearance for steering. Install cross braces of ½ by ¾-in. flat iron at the rear end, Fig. 14. Make up the seat as shown in Fig. 13. This is of wood, with iron braces supporting the back, and short brackets beneath to which roller-skate wheels are riveted, as indicated in the detail. The rollers ride on flat-iron plates screwed to and overlapping the side members of the frame. The seat should have from 8 to 10 in. of travel, and should be

located in the most convenient position for the user. However, a location adapted to a 10-year-old boy will not be inconvenient for an adult of average size, as the seat slides.

In Fig. 10 is shown the steering bar, operated by the feet. The force of the thrust, when propelling the car, is taken by the foot brace, while the steering is done with the toes. Attach straps or loops cut from inner tubes to the foot brace, so that the passenger can pull himself forward on the seat at the end of







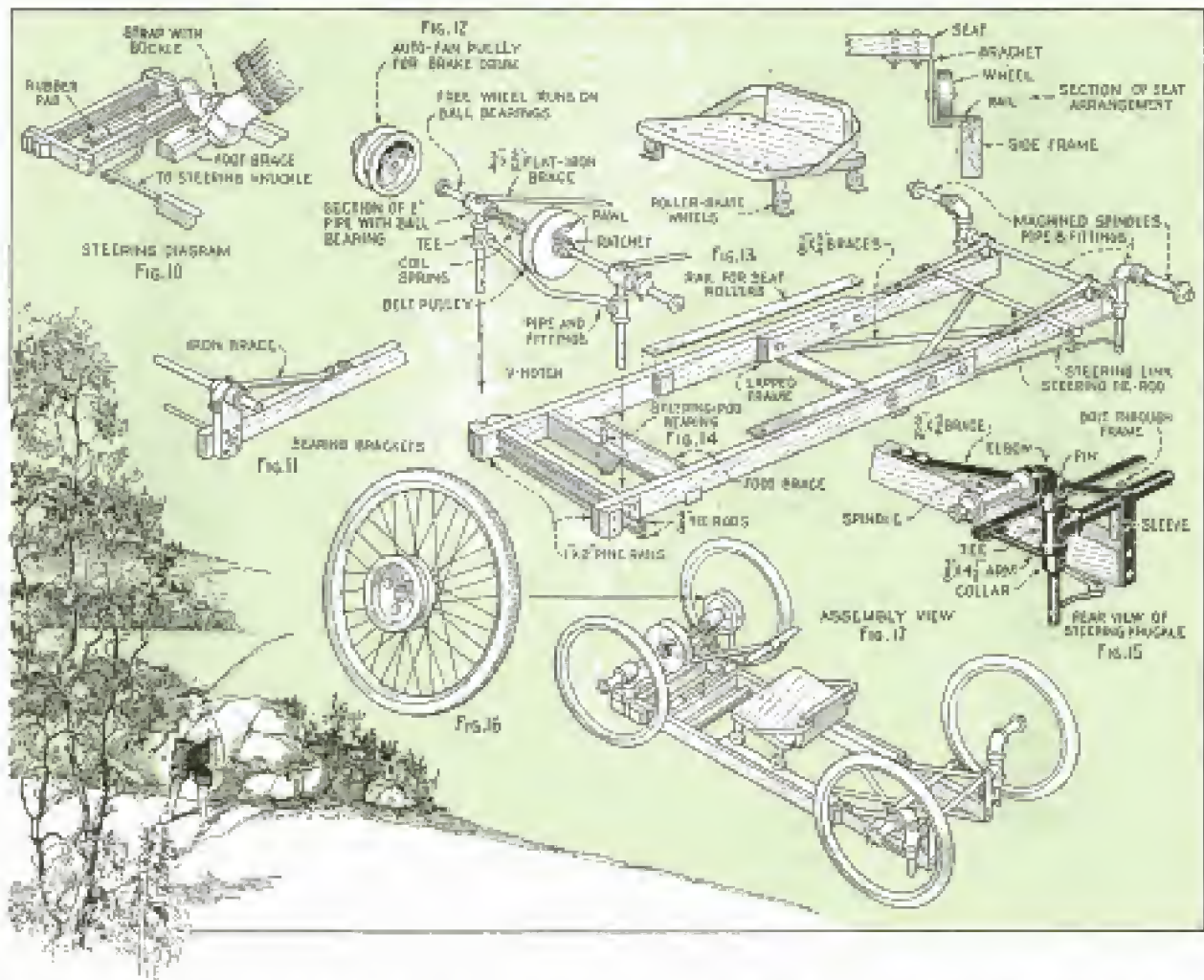
each stroke. A  $\frac{5}{8}$ -in. iron rod, bent at right angles, serves as a steering arm, and turns in a short section of pipe used as a bearing. The upper end of the rod is pinned to the center of the steering bar.

Assembly of the front axle is shown in Figs. 3, 4, 5 and 14. It consists of a straight axle riding in ball bearings supported by pipe fittings, with a ratchet pulley in the center and a coil spring to rewind the strap after each stroke. A simpler and less expensive bearing support is shown in Fig. 11, if you do not care to tackle the type used in the original. This will be satisfactory for a time, but will not remain in line as well as the former. Pipe fittings are also used for the rear-wheel assembly, as shown in Figs. 6 and 15, allowing the wheels to turn as in automobile steering. A front view of the drive assembly is given in Fig. 3. Details of construction for the machine work are shown in Fig. 4. Make the axle from a length of  $\frac{3}{4}$ -in. cold-rolled steel,  $30\frac{1}{2}$  in. long, with spindles and threads turned on the ends. Dimensions are not given

for the latter, inasmuch as there are several types of wheel hubs, and the particular hub chosen determines the exact size. Have the machinist turn the spindles to fit suitable cones and the hubs you have on hand. The free-wheel spindle is shown at the left side, while the cones, in reality bushings, on the right end are pinned to the shaft, the ends of the pins extending about  $\frac{3}{16}$  in. and fitting in slots ground in the hub. A nut on the end of the spindle holds the wheel on. For the shaft bearings, automobile ball bearings obtained from an auto-wrecking firm should be just the right size to slide over the shaft and fit inside of a length of  $1\frac{3}{4}$ -in. pipe. Small screws prevent the bearings from coming out of one end, and the end of the upright pipe, which is screwed into the pipe housing, also helps to hold the ball bearing in place. Both shaft bearings are made up the same way and are braced by means of tees and a crossbar, as shown in Fig. 3.

The construction of the ratchet pulley is indicated in Fig. 7. Turn a wood hub





3½ in. in diameter and bore it to take a pipe sleeve snugly. The sleeve should be slightly over ¾ in. in inside diameter, so that it will turn freely on the live axle. Fiber or ¼-in. plywood may be used for the flanges of the ratchet pulley. The pawl is ground down from a piece of hard steel and the ratchet itself is made from an ordinary spur gear with hub and setscrew. It may be necessary to turn down the teeth, as the ratchet will work better if the teeth are not over ⅜ in. deep. A small wire spring keeps the pawl against the gear. Screw a leather or a fabric strap to the hub, loop the end and use a piece of broomstick for the grip. The exact length of the strap can readily be determined by experiment and depends on the user. Greater leverage is obtained by leaving several wrappings of the strap on the hub, thus increasing its diameter. If you are unable to find a suitable coil spring at the junk yard, it is a simple job to make one from ⅛-in. steel wire. Anchor one end to the bearing by means of a screw and the other to the pulley, so that,

in pulling the strap, the spring winds up. In other words, the coils should tighten on the power stroke.

A neat auto-type brake can be made by using an auto-fan pulley for the drum and a steel band, lined with brake fabric and operated by means of a long lever, as shown in Figs. 3, 8, 12 and 16. Attaching the pulley to the wheel hub is done by welding a flange to the hub and then bolting the pulley to this. In using this type of brake be sure that it does not drag until the lever is pushed down. In Fig. 9 is shown a simpler type of brake, which is also effective, but has the objectionable feature of wearing down the tires. It is important that the steering wheels line up properly and turn freely. The steering knuckles, shown in Fig. 15, are made of a machined spindle, similar to that of the free front wheel, and are set in an elbow.

The entire steering assembly is shown in Fig. 14, being made of 1½-in. pipe and fittings. The steering arm passes through a collar on the steering axle just below the tee, Fig. 15. As the weight of the rear





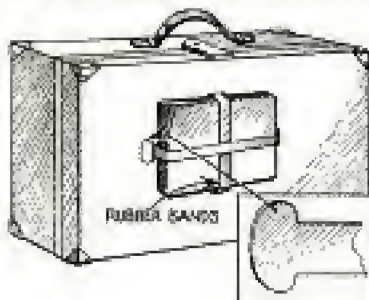
With This Light But Sturdy Landskiff Speed Is Only Limited by the Strength of the Pilot

end of the vehicle rests on these collars, they should be filed smooth, or better still, a ball thrust bearing should be inserted at this point. Note the flat-iron braces on the side frames and over the cross pipe of this assembly. Similar braces are installed at the front end.

With the steering gear connected, you are ready for the try-out. At first you may find it awkward to steer, owing to the fact that it may be different from any with which you are familiar, and also because you cannot see the steering wheels. But you will soon learn the trick. Just how fast these scooters can go depends entirely upon the strength of the pilot, and you may be assured that this light vehicle will develop all the speed you care to experience.

#### Rubber Straps Hold Magazine on Side of Suitcase

Travelers will find this method of holding a magazine on a suitcase convenient.



Place the magazine against the side of the suitcase and mark its position. Then cut four slits in the side as indicated, to receive rubber bands cut from an old inner tube, with a tongue at each end. The

magazine against the side of the suitcase and mark its position. Then cut four slits in the side as indicated, to

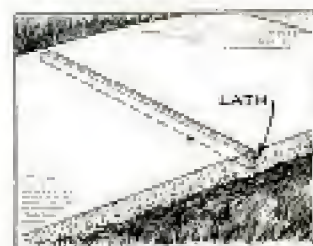
length of the bands should be slightly less than the distance between the slits, so that they will remain flat. In use, the magazine is slipped under the bands. Make the holder of such size as to take the largest magazines used, as it will also accommodate the smaller ones.

#### Effective Method of Cleaning Rugs

Rugs can be cleaned much better with the vacuum cleaner if they are hung on a line outside and the dust bag is removed, so that the cleaner will operate more efficiently. Go over them slowly on the side opposite the wind.

#### Lath Prevents Irregular Cracks

When laying sidewalks, place a lath across the walk and directly under the panel joints. This will prevent irregular cracks in the walk, which frequently result when the earth underneath settles. If the strain becomes so great that the walk will crack, it will break along the expansion joints.



#### Homemade Fireproof Cement Seals Exhaust Manifold

Leakage of exhaust-pipe fumes at the manifold connection of an auto motor is highly objectionable and can be effectively stopped by applying a mixture of asbestos shreds and plaster of paris, which makes a fire and waterproof cement. Sheet asbestos is torn into small pieces, which are soaked in water and thoroughly mixed with the plaster until the consistency will be like putty. Force it tightly between the loosened joint and draw the bolts up tight before the plaster sets. This cement has been found very durable and will not crack.

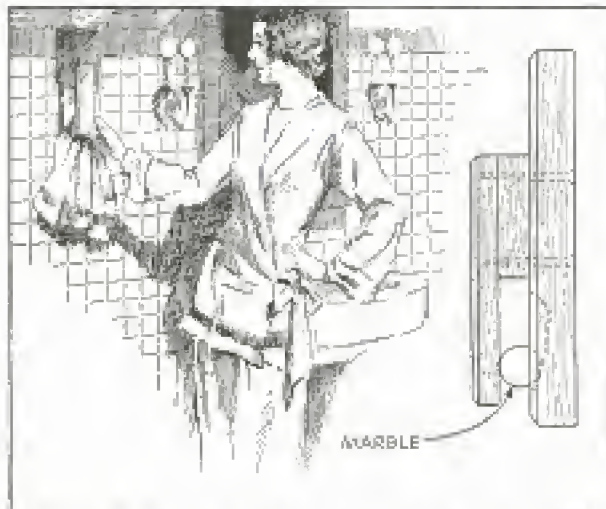


### Tagging Unfamiliar Wires When Overhauling a Motor

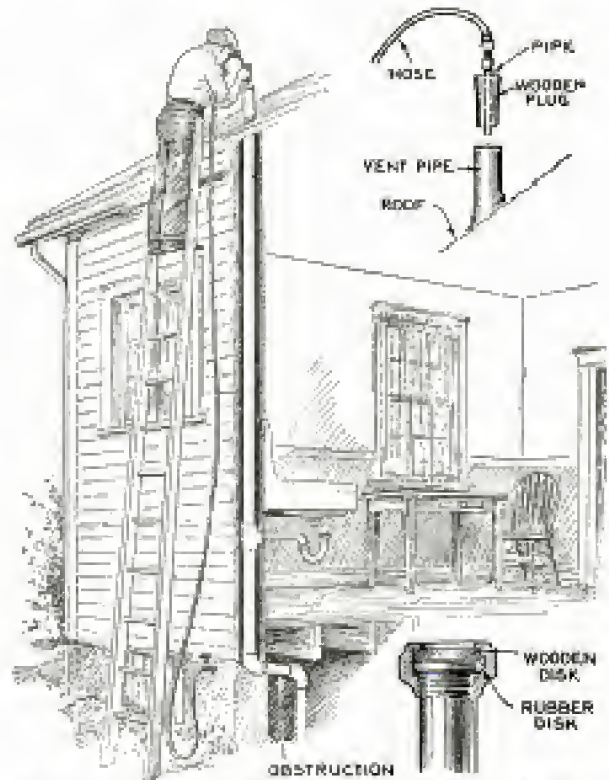
When overhauling your car, it is often necessary to disconnect part of the wiring, and if you are not familiar with it, difficulty may be experienced in re-connecting the wires correctly. By marking tags and tying them to both the wires and the connections from which they are removed, such trouble can be avoided.

### This Holder Grips Towels Firmly

Made from three pieces of wood and finished to suit, the illustrated towel holder provides a firm grip. The construction is clear from the right-hand detail, two or three finishing nails being used to hold the parts together. Before assembling, cut an egg-shaped groove near the lower end of the larger piece to accommodate a marble. The pieces must be separated so as to prevent the marble from rolling out, this space being determined by the thickness of the middle piece. The most convenient size for the larger piece is 6 by 2½ by ¾ in., while the front piece should measure 4 by 1¼ by ¾ in., and the separating block 2 by 1¼ by ½ in. The edges of both top and bottom pieces should be beveled ⅛ in. and two or three nickel-plated countersunk screws are used to fasten the holder to the wall. In use, the towel is slipped up against the marble, which slides back into the groove, and a slight downward jerk wedges the marble against it securely. To remove the towel push the marble up with the finger.—Donald Kelly, Huntington, W. Va.



Marble Held in Egg-Shaped Groove Grips Towel Securely in This Wooden Holder



Water Pressure Applied to Sewer Drain Is Effective in Loosening a Stubborn Obstruction

### "Sure-Fire" Method of Opening a Clogged Drain

When both plunger and cleaning compounds fail to clear a clogged drain, try forcing the obstruction out with water pressure as indicated in the drawing. The trap under the sink is first unscrewed and the open end plugged with a wooden stopper and rubber gasket as shown in the detail. Also other drain outlets above the point of obstruction must be suitably closed. Now get out your ladder and climb to the roof, pulling the garden hose along with you. Fit a wooden plug into the open end of the vent pipe and drill a hole through the plug to fit the hose nozzle snugly. Then turn on the water. Although the obstruction may withstand the pressure for some time, it will eventually come loose and the pipe will be cleared. This method is, of course, much preferable to pulling up the floor and removing the drain pipes, which should be done only as a last resource.

❑ If you need calling cards and are out of them, cut out your typewritten name and address from old envelopes and letters; these will serve until printed cards can be obtained.





Match Boxes Covered with Fancy Envelope Lining Resemble Books

### Fancy Envelope Paper Decorates Small Match Boxes

Small match boxes that lie around on your smoking table can be embellished by covering them with fancy colored paper such as used for many of the better-grade envelopes. Cut the latter open to form a flat sheet and paste it onto a piece of light cardboard, previously cut about  $4\frac{1}{4}$  by  $2\frac{3}{4}$  in. in size, so that the colored side of the paper will be exposed. The latter is carried over the edges of the cardboard for about  $\frac{1}{2}$  in. all around and the improvised cover is then bent around the match box so that it resembles a book cover, and is pasted on.

### Attaching Ratlines to Shrouds of a Model Ship

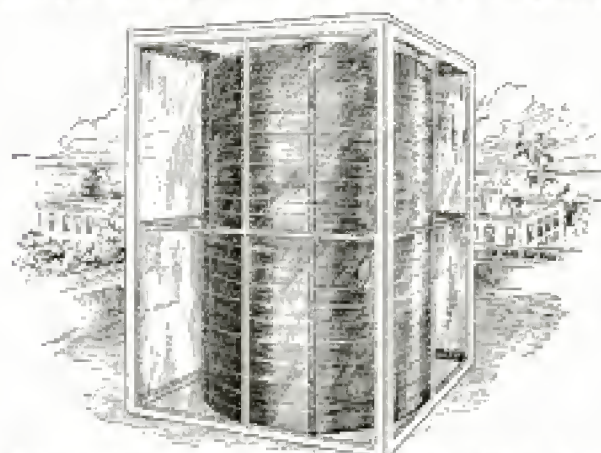
Because of their close spacing, it is often difficult to attach the ratlines to the shrouds of a model ship by knotting them in place. A better method is to cut each ratline about 6 in. long, "spot" each shroud where the ratline is to cross with ambroid and, after this dries, again "spot" the shrouds with fresh ambroid, then press the ratline in place. Leave the ratlines long when this is done so that they may be easily handled if the ambroid does not hold. Then cover each ambroid joint with quick-drying varnish. After the varnish has set, cut off the long ends of the ratlines close to each outside shroud. The result is a much neater job.

### Safety Precautions in Woodturning

Beginners in woodturning should remember the following safety precautions: Keep your sleeves and necktie away from the moving parts of the lathe. When sandpapering, stand facing the headstock so that your left hand is over the work. Adjust and clamp the tailstock firmly. Use a mallet, not a hammer, to drive work into the live center. On some lathes it is necessary to remove the live center and drive it into the work. After tightening the tailstock, back it off slightly, so that the work will turn freely on the centers. Always oil both the dead center and the end of the work so that the center will not be burned. Adjust the toolrest so that it is about  $\frac{1}{8}$  in. from the work, and clamp firmly. Before turning on the power, test by turning the work by hand to be sure it doesn't strike. Readjust the toolrest from time to time to maintain this distance between the work and rest. Always grasp your tools with the right hand near the outer end of the handle. The tools have long handles to give you the necessary leverage.

### Glass Inclosure Retains More Heat for the Water Tank.

Where the solar system of warm-water supply is used, more heat can be retained



Glass Inclosure for Solar Water Tank Keeps Cool Winds from Lowering Its Temperature

and the temperature of the water correspondingly raised, by providing a glass inclosure for it. The "cage" is built up of storm sash. It will be found an adequate protection to keep the cool night winds from lowering the temperature of the water.—A. Ruhland, Philadelphia.

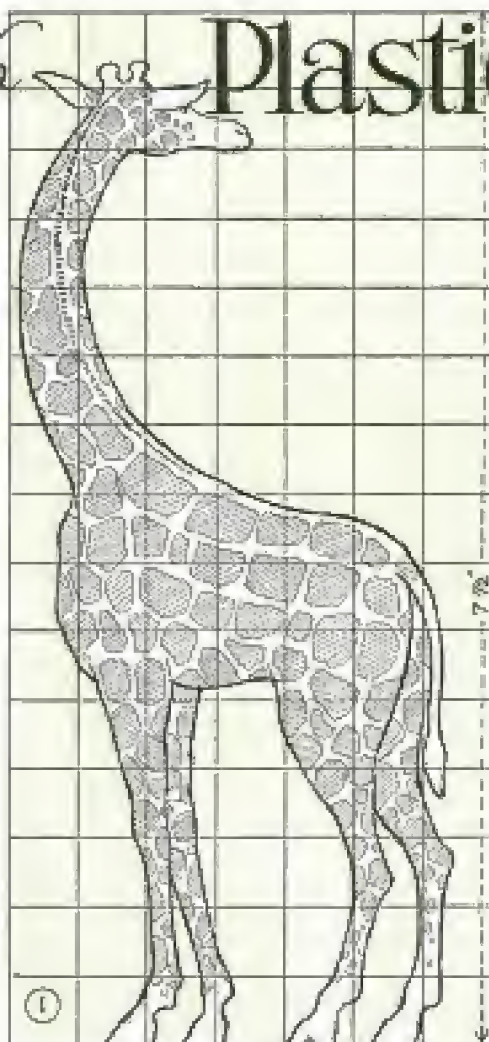


# Fun *with* Plastic Wood

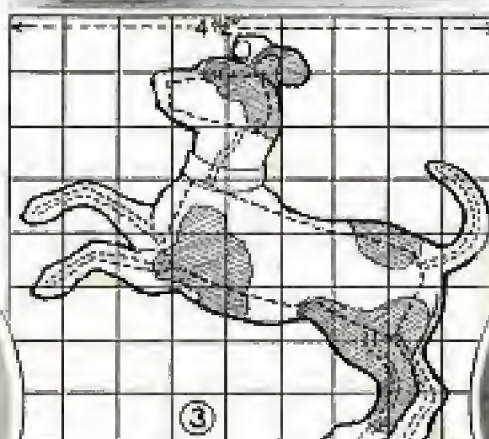
**M**AKING little plastic-wood caricatures is an interesting diversion. Toy menageries can be assembled, or burlesque figures of your friends.

As plastic wood sets quickly you cannot take much time in working over the details. The photos and drawings illustrate examples of the work, and although the "sculptor" who made these models has never won any medals, the results are pleasing, and you, too, will be able to produce such figures with equal skill. Wire can be bent to any desired shape and is, therefore, well adapted to make the skeleton or frame on which the plastic wood is applied, but large parts had better be cut from wood, as it saves considerable plastic wood.

To build the animals, first whittle the body out of soft wood, such as white pine or cedar. Make a slot between the shoulders to receive the neck with the head at-



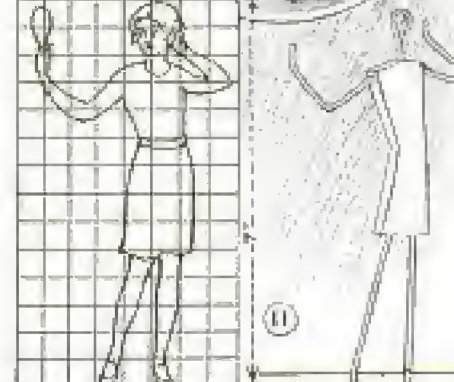
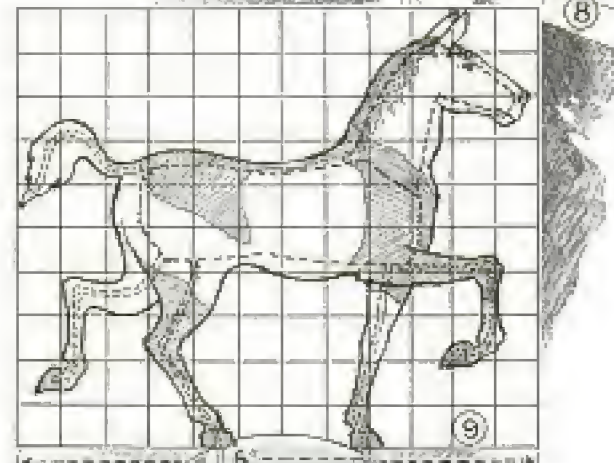
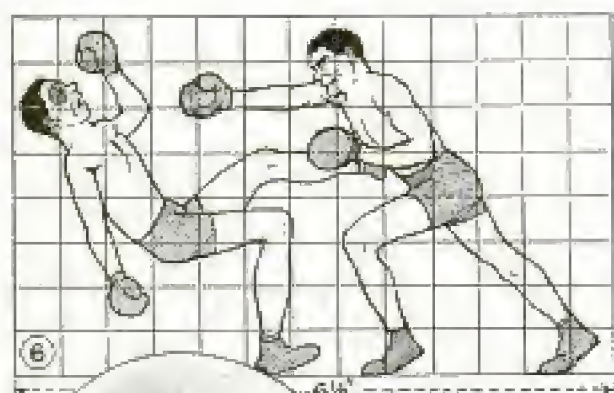
tached, gluing it in place, or using small brads. Cigar-box wood has been found highly suitable for making heads. A few holes should be drilled through it so that the plastic wood will anchor properly. The main body should be roughened with a rasp or jackknife, and small brads driven part way in. Holes are drilled to receive lengths of wire for the legs and other parts. Then apply the plastic wood, using the fingers and building it up as fast as possible. Use the material sparingly, for it is easier to build up than to cut and sandpaper it down after it has dried. By building up here and there gradually, you will be surprised how realistic the little figure becomes with each application. When you have gone as far as possible in this manner, allow the job to harden in the sun or near a warm-air register. After that, cautious work with a sharp jack-



A Menagerie of Domestic and Jungle Animals, or Caricatures of Friends Can Be Formed with Plastic Wood







knife will improve it still more. The finishing is then done with sandpaper and a small coarse file. Ears, cut from tough wrapping paper, are glued on, and the entire job is given a coat of brushing lacquer, the color depending on the subject. The little calico pony, Figs. 7, 9 and 10, was given three coats of white lacquer, which dries in half an hour, and then the brown body markings were painted on, together with the black mane and tail. When dry, it was mounted on a wood base, stained moss-green. Extensions of two of the leg wires were set in holes in the base to hold the pony in position. The romping puppy, shown in Figs. 2 and 3, was made in the same way except that it has a wire neck frame.

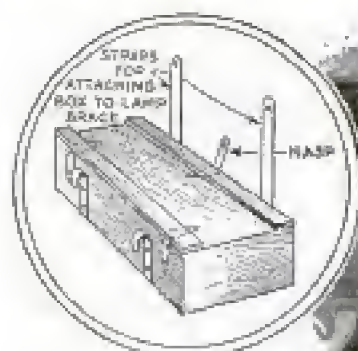
In making the prize fighters, shown in Figs. 4, 5 and 6, blocks were used for the bodies and bases, while the head frame was merely a wire loop. This group is much easier to make than it seems. The important point is to get the action in the skeletons. When building up human figures, there is usually a tendency to get too much plastic wood in spots, particularly on the legs and arms, so build these up with care. After applying three coats of white lacquer, the bodies are given a flesh tint by mixing artists' white oil paint with a trace of vermilion and cream. A light tint is given the arms, legs and torso, but a higher color is applied to the face, particularly on the cheekbones. One eye of the falling boxer may be painted black to add a touch of realism. Trunks are colored blue and red respectively, shoes black and gloves brown, while the hair is black or brown.

To caricature one of your friends, make the figure larger than the others, say about 7 or 8 in. high, in order to have features and other details on a fairly large scale. Emphasize or exaggerate distinguishing features, such as spectacles, moustaches, an unusual hat or pattern of clothes, extreme height or fatness. Such accessories as hooks, umbrellas and canes, can be made of paper, cardboard, cloth and broom straws.

Animals probably provide the most entertainment, however, as there is a large variety to choose from when you build up your menagerie. Incidentally, your skill will improve with each successive figure. The three figures shown in the photos were made with one 30-cent can of plastic wood. Other suggestions are the giraffe shown in Fig. 1, and the flapper of Fig. 11.



## TOURISTS' KITCHEN BUILT ON FRONT AUTO BUMPER



Compact Camp Kitchen Installed on the Front Bumper



Instead of having the cookstove, the utensils and table packed away inside of the car or on the running board, why not build a box behind the front bumper to hold these accessories? The advantages of such an arrangement are accessibility and the use of space which is otherwise wasted. A wood or sheet-metal box is built to fit between the radiator apron, the frame members on the sides and the bumper. It may be fastened in place permanently or hooked to the bumper and attached to the lamp brace with suitable straps and bolts, as shown in the upper right-hand detail. The inner arrangement of the box is left to the user's choice. In the case illustrated, it was found that the camp stove would fit nicely in the box and that there was sufficient space left above it for pans and kettles. The lid may be hinged to open outward, forming a table, if desired. The lower right detail shows the use of thumb screws for tightening a cover that is not hinged. A sheet of canvas, with grommets to permit attachment to the car frame, a couple of 6-ft. poles, and some rope will make a good shelter in the sun or rain. Tourists who do not wish to spend much time for meals while on the road, will appreciate the saving of time effected by using a convenient kit like this.

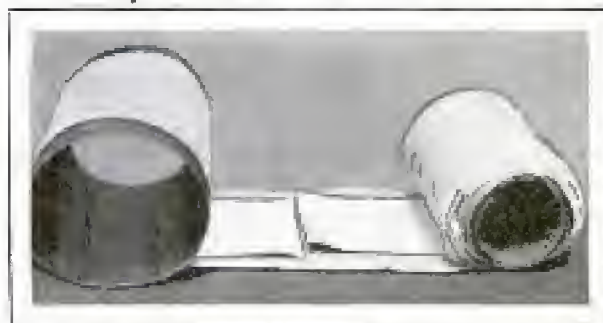
#### Paper Protects Tennis Racquet

Heavy brown paper, such as comes with suits from the tailor, wrapped around the tennis racquet will prevent the strings from breaking in damp weather, and will also protect the frame and handle. Golf

clubs can also be guarded in the same way. It is a matter of a few seconds only to apply the paper, and the time taken may save spending several dollars for a new club or repairs to the racquet.—S. B. Bruce, Houston, Tex.

#### Cheesecloth Rolls Dry Photos Flat

Curling of photo prints can be remedied by drying them between two rolls of cheesecloth. The prints are arranged so that they are curved backward in the roll. When dry, they can be laid on a table and will then gradually assume a flat shape. The rolls consist of cylinders roughly formed from window screen, which permits sufficient circulation of air. A roll of corrugated paper serves as a spool for the unused cheesecloth. The two rolls are arranged on a table with a section of cloth lying flat. The prints are laid face

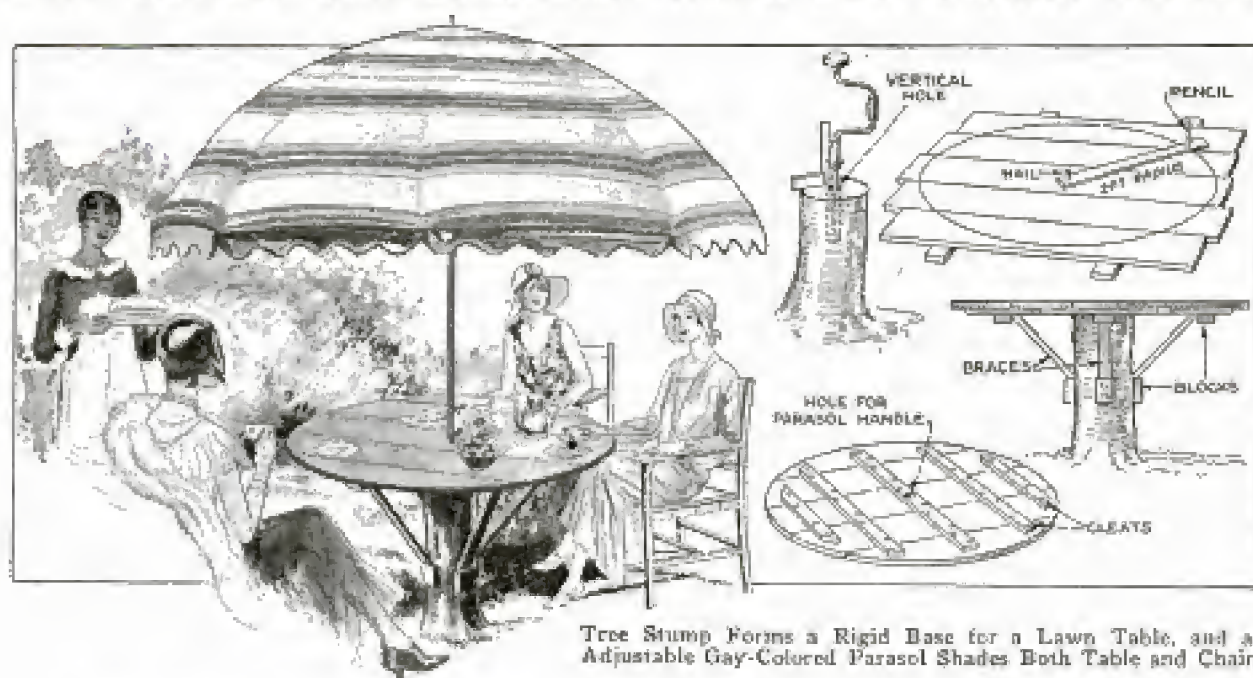


Screen-Wire Cylinder Covered with Cheesecloth Dries Prints so That They Do Not Curl

down on this and the screen cylinder, covered with a couple of turns of cloth, is then rolled over the prints.



# OLD STUMP FORMS RIGID BASE FOR LAWN TABLE



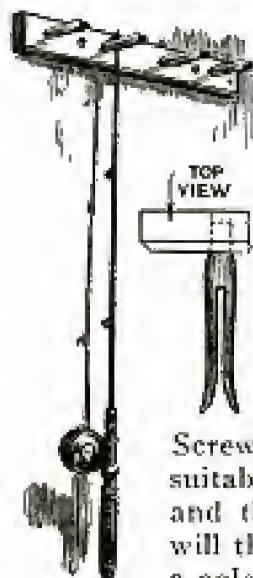
Tree Stump Forms a Rigid Base for a Lawn Table, and an Adjustable Gay-Colored Parasol Shades Both Table and Chairs

It may be a good idea to save that dead stump in the garden as it makes a sturdy one-leg support for an outdoor tea table, especially when shaded with a gay-colored parasol. Cut the stump off squarely about 27 in. above the ground and bore a hole, about 7 in. deep, in the center to receive the parasol handle. Care must be taken to bore the hole absolutely vertical. A friend can tell you if the bit is going straight or leaning to one side. The table top should be made of  $\frac{3}{4}$ -in. stock, preferably cedar, to any desired dimensions, although a 4-ft. diameter has been found most convenient. Nail the boards to three battens temporarily, and scribe the circle with an improvised compass. The boards are then removed from the battens and sawed separately with a keyhole saw. Five permanent battens,  $\frac{3}{8}$  in. thick, are screwed to the boards, with No. 5 flat-head wood screws,  $1\frac{1}{2}$  in. long. A  $1\frac{1}{4}$ -in. hole is bored through the center of the table top to line up accurately with the hole in the stump. Two long nails hold the table on the stump. Braces supporting the edge of the table must be cut one at a time and fitted to make the top perfectly level. If you have no carpenters' level, a flat pan, half-full of water, can be set in the center of the top to show whether it is level. When finished, smooth the edges and stain or paint. This type of table is particularly desirable on the lawn, as it cannot be

tipped over and, having only one leg, chairs can be drawn under it at any point. With a tilting adjustment on the parasol handle, complete shade can be kept over the table and chairs at any hour.

## A Rack for Fishing Poles

In summer cottages at resorts, where the fishing poles are often in daily use and are not taken apart but stood up in a corner, it is a good idea to hang them on a rack in order to prevent the possibility of damaging them. A handy rack for this purpose is shown in the drawing. It consists of a 1 by 3-in. length of wood drilled at equal intervals to receive the solid end of ordinary clothespins, after the heads have been cut off. Use glue and drive the pins into the holes snugly.



Screw the rack to the wall a suitable distance from the floor and the split end of the pins will then readily accommodate a pole.

☛ A little wad of fine steel wool makes an excellent eraser of ink lines.

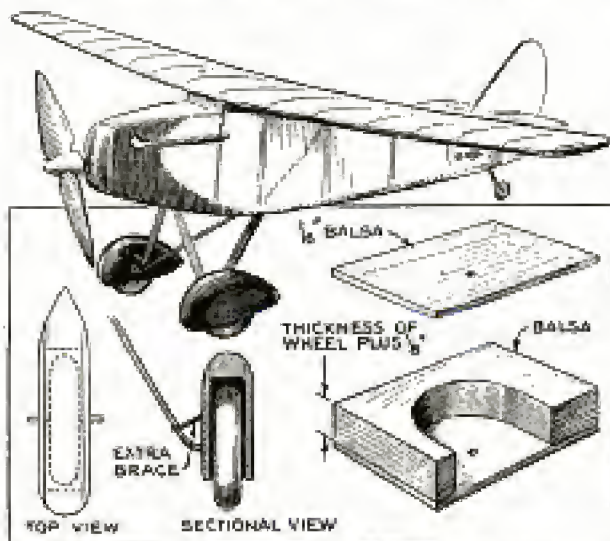


### One Flash for Three Exposures

Regardless of the comparatively low cost of the new flash lamp, it does cost considerably more per flash than the powder. If the photographer has more than one camera, one flash can be used for several exposures. Focus all the available cameras on the subject from different angles. In portrait work, a side view, a front view and a three-quarter view thus can be taken with one flash, if three cameras are used. This method is good when children or restless grown-ups are to be photographed.

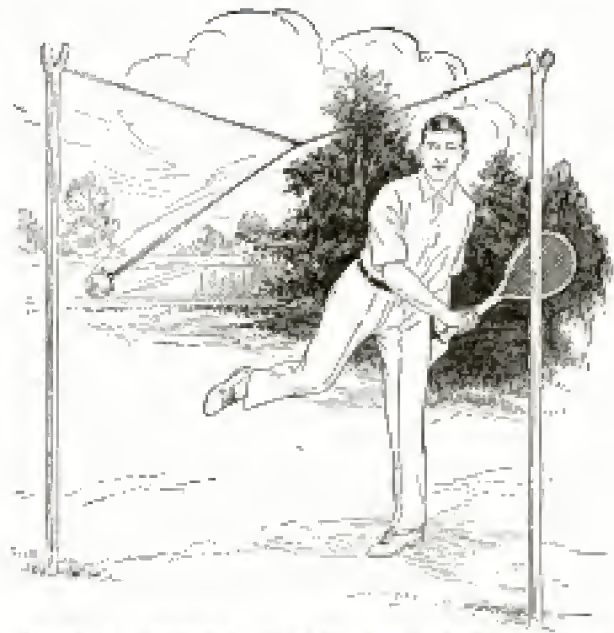
### Streamlined Wheel "Pants" Help to Dress Up Model Planes

Well-dressed model airplanes are now wearing wheel "pants," light streamlined housings similar to those built for full-size craft. They add much to the appearance of the up-to-the-minute model, and the extra weight is very small. They can be made in several designs, one of the simplest being shown here. Two sidepieces of  $\frac{1}{8}$ -in. sheet balsa are fastened with ambroid to a central block cut out to accommodate the wheel. After the ambroid has hardened, the streamlining is finished by whittling and smoothing with sandpaper. Allow at least  $\frac{1}{8}$  in. on each side of the hub for clearance between the wheel and the housing. Small beads or



Streamlined Wheel "Pants" of Balsa Are Negligible in Weight and Improve the Appearance of Model Planes

washers are used for spacers. The pants are held by means of an extra wire brace fastened to the landing struts, or by ambroiding them to the fairing strips.



Simple Arrangement for Playing Solitaire Tennis, Indoors or Outdoors, Keeps You in Trim

### Solitaire Tennis for Practice and Amusement

Besides providing plenty of exercise and amusement, solitaire tennis, which can be played either outdoors or indoors, gives you a chance to develop skill by constant practice. The ball is suspended from a 3-ft. strip of inner tube, 1 in. wide, a safety pin being used to attach it to the strip. The upper end of the strip is tied to a similar strip, 4 ft. long, held horizontally between the tops of two posts, strong, light ropes being tied to the ends of the rubber strip and to the posts. Once the ball is hit, the player will be kept on the move.—Louis Andrews, St. Louis, Mo.

### Water Heater Cools Motor Oil

Your water heater can be used in summer to keep the engine "comfortable" by cooling the oil. The little radiator, which comprises the heating unit, should be mounted under the hood directly behind the fan, and it may be necessary to remove the small motor and fan from the heater. By circulating the engine oil through the radiator as is done on racing cars, it will be kept cool, and this will minimize engine wear. In making the oil-line connections, run one lead from the discharge of the oil filter to the radiator, and the other from the radiator to the engine, which prevents undue oil pressure on the radiator.





Many Uses Can Be Found for a Sharp Food Chopper Consisting of Razor Blades

### Razor-Blade Food Chopper

Old razor blades, spaced apart with washers and held together on a wooden handle by means of stovebolts, form a food chopper that will come in handy around the kitchen. Its construction is self-evident from the illustration.

### "Bellying" Paper Sails

Onion-skin or other paper sails for ship models can be "bellied" in the following way: When the sails are in place, bend a stiff wire to form a hook, with the curved end slightly longer than the width of the widest sail. Dip this end in boiling water and "iron" each sail by pressing the hook against it and moving it up and down. This partly forms the sail and dampens it. Before it is dry, heat the hook in an open flame until it can barely be touched without burning the hand, and again iron out the sail with the heated hook.

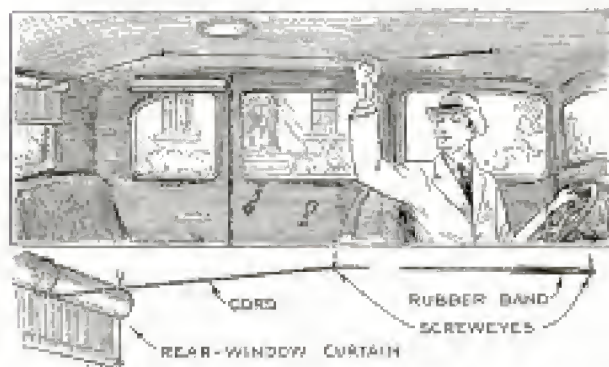
### Flying "Blind" Economically

In the absence of an air-speed indicator, a drift meter, a rate-of-climb indicator and a lateral inclinometer, a reliable and serviceable substitute can be made cheaply. It consists of a piece of ribbon, about a yard long, and two 6 or 8-in. strips of brass with a hole in one end of each. Tie the ribbon to the trailing edge of the wing, far enough out to avoid the slip-

stream. Fasten one brass strip to the instrument panel and the other to the side of the fuselage, using screws or stove bolts for pivots. Now tackle a heavy cloud or fog bank. If the strips hang downward vertically, and the ribbon streams straight back, parallel to the fuselage, everything is all right. If one wing drops, the brass strip on the instrument board will point toward the low side. This is your lateral inclinometer. If the nose drops, the brass strip on the fuselage will point to it, indicating descent, and away from it if you are gaining altitude. This is the pitch indicator. For yaw or turn, watch the ribbon. If you wish to fly into the wind, keep the ribbon streaming back parallel to the fuselage. If your course lies at an angle to the wind, note the relation between the ribbon and the fuselage when you are flying in the proper direction. After you hit the fog, keep the ribbon at the previously observed angle. If it bears to the left of this point, you are turning off course to the right, and vice versa. This serves as a turn indicator. After a little practice, you will be able to form a pretty good idea of your air speed from the varying stiffness of the ribbon.—Norval Ballard, Reno, Nev.

### To Lower Rear Curtain from Front Seat

Most auto drivers will find the installation of a cord to control the rear-window curtain a great convenience, as it eliminates the necessity of stopping. A couple of screweyes are driven into the top braces, and a length of strong cord is tacked to the curtain rod while the latter is lowered.



Length of Strong Cord from Rear Curtain to Driver Permits Lowering or Raising It

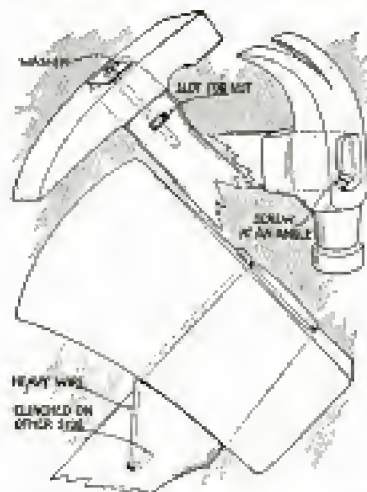
The free end of the cord is then threaded through one screweye and tied to the



other where it can be reached by the driver. A pull on the cord brings the curtain down, and a slight jerk releases the catch and allows the curtain to be raised.—Bert Wilson, Toppenish, Wash.

### Hammer Heads Fastened Securely

Wedges driven into the end of a hammer handle do not always hold it in place tightly. To prevent the head from coming off, use any one of the methods shown in the illustration. A screw driven into the end of the handle at an angle will usually be a sufficient safeguard against accidents. A length of heavy wire, slipped through the head under the handle and securely anchored in the latter, and bent over at right angles at the other end to form a hook, has been found effective.



The third method is also practical for keeping the head on, but has the disadvantage of reducing the strength of the handle and for this reason should be used only on wide handles such as are provided on hatchets. In this case, a hole is drilled lengthwise into the end of the handle, and a slot is cut to hold a nut. After slipping a washer, which should be wider than the head, on the end of a machine screw, the latter is pushed into the hole and the nut turned on the threaded end as indicated.

### How to Avoid Corrosion of Copper Screens

After copper screens have been exposed to the weather for some time, corrosion is washed down by rain and will stain light woodwork under it. To avoid this trouble, the screen should be given a coat of paint, sufficiently thinned with turpentine to prevent it from closing the openings between the wires. Stains resulting from this cause can be partly removed with soap and water, but not entirely.



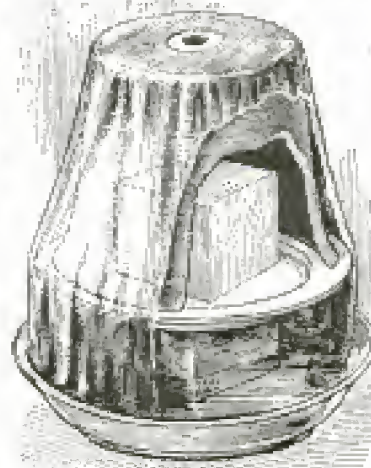
Strip of Inner Tube Prevents Breaking of Line for Marking Garden Rows

### Rubber Band Prevents Breaking of Garden-Marking Line

A cord attached to two stakes for marking straight rows in the garden is often broken or the stakes pulled out, when accidentally caught with the foot. This trouble can be avoided by fitting a piece of inner tube at one end of the cord.

### Flowerpot Keeps Butter Cool

Although the principle of this butter cooler is not new, the particular application has been found very effective. A deep dish is filled with water and an empty tin or block of wood is placed in the center. A shallow plate holding the butter is set on the block, and a porous flowerpot is inverted over the plate. Both flowerpot and plate are covered with a piece of loosely woven cloth, the edges of which extend into the water dish. A hole is cut in the cloth directly over the hole in the flowerpot. —E. F. Leopoldina, Rio de Janeiro.




Chloroform will remove dried paint from cloth; use turpentine or alcohol for fresh paint.





# Boat and Trailer Add to

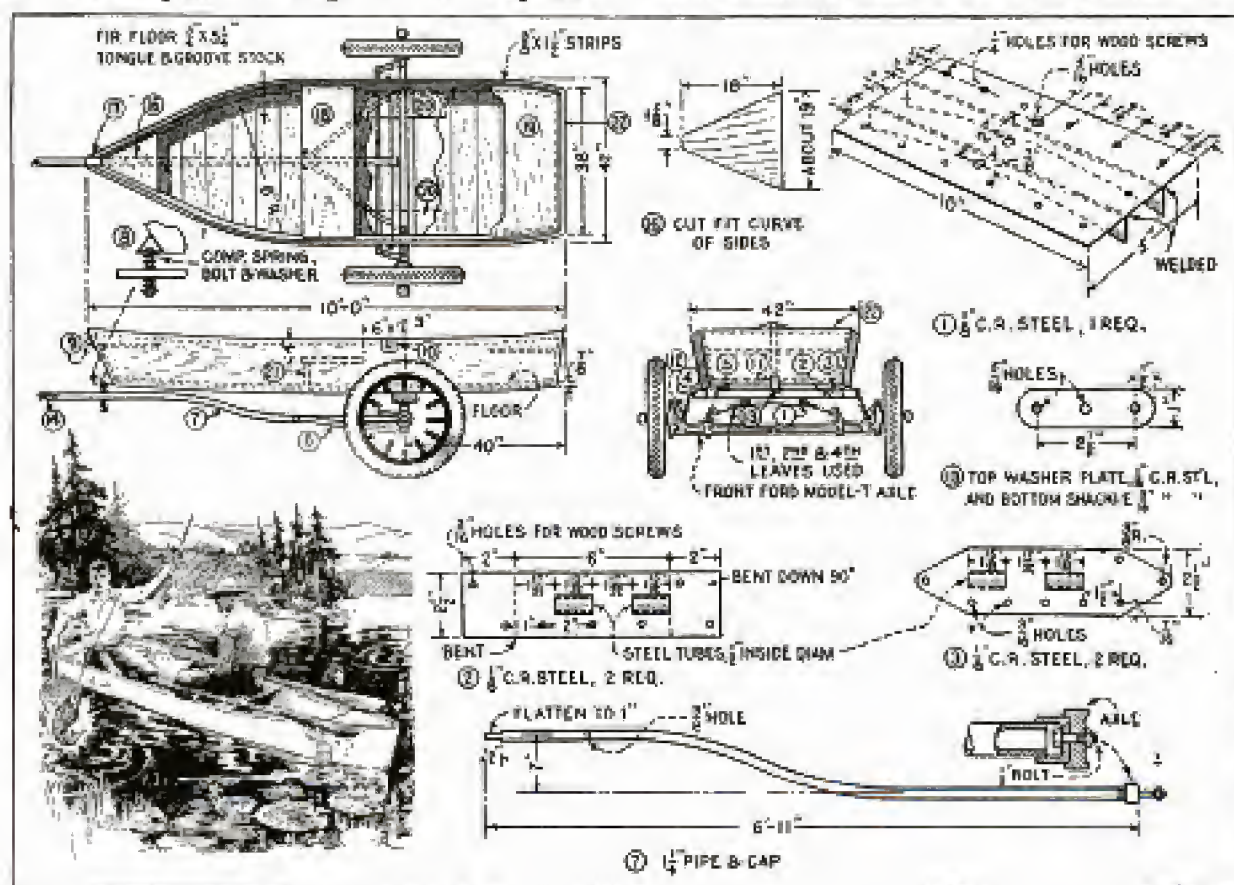
By W. W. ERICKSON



WITH this combination boat and trailer you can visit those sequestered lakes in the wilds, and you will be sure to get around where the fish bite. The original outfit from which these plans were made, has been in use for several seasons and has stood the strain of hard usage.

Dimensions of the boat are given in the drawings, and also the size of screws, which should be flat-head and preferably brass. All screws are coated with white lead before driven in. The stern or transom, Fig. 22, and the sides, Fig. 15, are cut from clear white pine and screwed together as indicated. For use with an outboard, an oak transom is preferable to white pine, owing to its superior

strength. Before bending the sides, which is the next operation, they must be thoroughly soaked. Cut out the seat brace, Fig. 21, and place in its approximate position, after which the sides are drawn together at the front by means of a rope so that they will fit snugly against the seat brace. If necessary, tack the latter in place lightly. The rear floorboards are then cut from tongue-and-groove fir, to fit between the sides and  $\frac{1}{8}$  in. above the bottom edge, two screws being driven through the sides into the ends of each floorboard. Bevel the ends and the side of the rear floorboard to meet the pitch of the sides and transom, and coat the adjoining edges liberally with white lead before assembling. Continue with the floorboards until you reach the seat brace. Screw the seat brace in place, apply quarter-round molding to support the seat and attach the latter. The first four floorboards ahead of the seat brace are first assembled on the floor and the ends cut

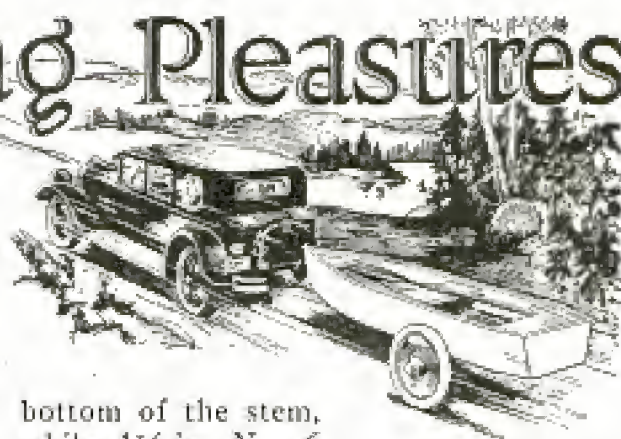




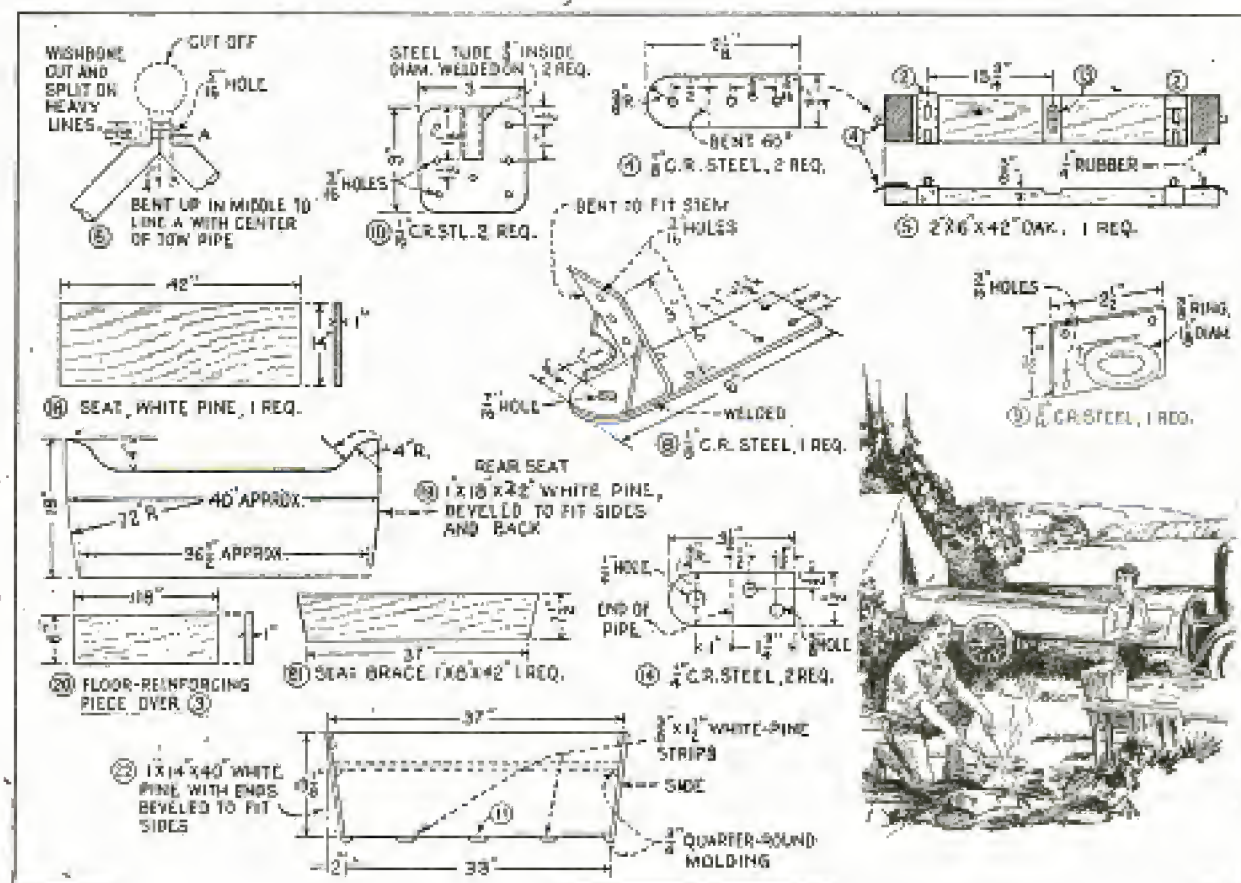
# Your Camping Pleasures

off to a 6-ft. radius, as shown in the plan view, and the ends are beveled to fit the sides. When these have been screwed in place, get a piece of 1 by 1½-in. white pine for the stem, Fig. 17, to which the sides must be screwed. Bevel it at the lower end to meet the floor, which is applied later at this point, and then bevel the front ends of the sides to fit the stem, after which the sides are screwed on, allowing the waste end of the stem to project above, to be cut off later. The remaining floorboards and front seat are then assembled. Line the top inner edge of the sides with ¾ by 1½-in. strips, as shown in Fig. 22, fastening these with ¾-in. No. 5 screws, driven 3 in. apart.

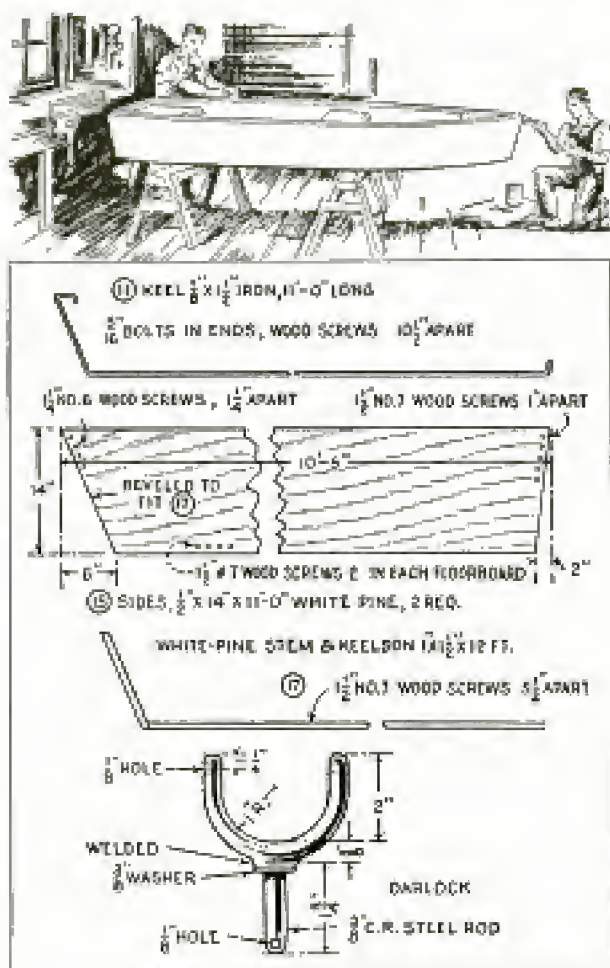
Next turn the boat upside down and apply the  $\frac{1}{4}$ -in. quarter-round molding to reinforce the floorboards, coating the molding heavily with white lead and using  $1\frac{1}{4}$ -in. No. 6 flat-head screws, spaced 3 in. apart. The molding should be soaked before bending. The keel, Fig. 11, is bent as indicated and bolted to the top and



bottom of the stem, while 1¼-in. No. 6 screws are used to attach it to the floorboards and keelson, which is cut to fit inside, directly over the keel. Screw holes in the keel are countersunk so that the screws will come flush. Avoid placing screws through the joints of the floorboards. The keel may be brought over the top of the transom to reinforce it. Place white-pine strips on the outside of the bottom, between the keel and sides, as shown in Fig. 22. Oarlock fittings, Fig. 10, are then made. Cut four pieces of ⅝-in. steel to the size indicated and weld short tubes to two of them, which are to be installed on the outside, while the other pair of plates are fastened op-







posite them on the inside, so that bolts can be drawn up snug. The inside diameter of the tubes on the fittings should be about  $\frac{3}{8}$  in., to receive the shanks of the oarlocks shown below Fig. 17. Reinforcing pieces, Fig. 20, are shown in position on the inside of the bottom in the plan view. Attach each piece with eight  $1\frac{1}{4}$ -in. No. 6 screws. Directly under them, on the underside of the boat, attach the fittings, Fig. 3, which in conjunction with the fittings in Fig. 2, attached to the crosspiece of the trailer, serve to hold the rear end of the boat down securely. The fittings on the boat are centered  $15\frac{3}{4}$  in. from the center line of the boat and 38 in. from the transom.

Now for the trailer. Get a front-axle assembly of an old model-T Ford. As the wheels are to travel in exactly the opposite direction to that they did on the car, it will be necessary to reverse the "toe-in" and set this in about  $\frac{1}{4}$  in., which is done by shortening the tie-rod. Do this after the tow pipe or tongue, shown in Fig. 7, has been bolted to the center of the axle, the method of attachment being

shown in the detail above Fig. 7. Adjust the front edge of the wheels exactly equidistant from the tow pipe, holding them in this position while the tie-rod is bolted to the tongue with a  $\frac{1}{4}$ -in. hole running through both at the point of contact. The end of the wishbone is cut off as shown in Fig. 6, and the end bent up so that point A lines up with the center of the tongue to which it is bolted with a  $\frac{1}{4}$ -in. bolt. Remove the second and fifth spring leaves and make the fittings shown in Fig. 2, so that the tubes welded to the surface of these will line up with those on fittings 3, permitting the insertion of a  $\frac{1}{2}$  by  $6\frac{1}{2}$ -in. capscrew for bolting them together. Fittings 2 are bolted to the top of the oak crosspiece shown in Fig. 5, the latter being held on the spring of the trailer by means of the plate shown in Fig. 1, which has sidepieces welded on to straddle the top of the spring. Pieces 1 and 5 are bolted to the spring with the use of shackle plates, as shown in Fig. 13, the top one being placed in a  $\frac{3}{8}$ -in. recess cut across the center of the crosspiece. The center bolt passes through the top shackle, the plate, the spring and lower shackle, after which the other two bolts are slipped through the plate and shackles. Lock washers are used on all bolts. Rebound springs,  $\frac{3}{16}$  by  $\frac{3}{4}$  in. in size, with a  $4\frac{3}{4}$ -in. space between the centers of the loops, which are shown at point 12 of the rear view, are fastened to the ends of the crosspiece by means of clips shown in Fig. 4, these being screwed to the ends of the crosspiece and bent downward. The other end of the rebound springs fastens to shackles attached to the axle at the points indicated. The front clamp, shown in Fig. 8, is made up of  $\frac{1}{8}$ -in. steel, bent to fit the stem and bolted to it. A  $\frac{3}{8}$ -in. hole in the lower lip must line up with a corresponding hole drilled through the tongue, as indicated in Fig. 7, for a bolt and a  $\frac{3}{16}$ -in. compression spring, 1 in. long and  $\frac{3}{4}$  in. in diameter. Flatten the end of the tongue to a thickness of 1 in., to provide a flat surface for the two pieces shown in Fig. 14, which permit attachment to a suitable universal towing joint on the rear end of the car. A slatted false bottom should be provided to cover the floorboards in order to distribute strain.



### Acid Solution Colors Brass or Bronze Green

Bronze or brass objects can be given a green finish known as "verde antique," which is acquired naturally on bronze objects exposed to the weather. Mix nitric acid, 8 oz., with water, 3 oz., and add some brass scraps. The action of the acid on the brass will turn the solution green. If a brown color is desired, add a small piece of sheet iron to the green solution. Heat the object to be colored and apply the solution with a brush or swab. It is best to do this while holding it over the burner. When cool, it can be given a waxed finish with beeswax applied with a brush. —Charles B. Barr, Stratford, Conn.

### Paris-Green Paint Kills Rats

Composition boards, often used to line barns, poultry houses, etc., to keep them warmer, are much softer than natural wood, providing a "mecca" for rats and mice. A solution of  $\frac{1}{2}$  pt. of paris green to 1 gal. of oil or paint, applied to the boards, placing the painted side next to the studding, has been found a successful method of killing the rodents.

### Scale for Measuring Fish Painted on Pole



much handier. Mark a number of rings at 1-in. intervals around the pole, beginning a couple of joints from the end.

Where state game laws prescribe certain lengths of fish that may be taken, the angler should have some means of measuring his catch. A small ruler will answer the purpose, but it is easily lost or misplaced. A scale painted on the pole will be found



Pipe Legs and Crosspieces, Connected with Suitable Fittings, Provide Support for Typewriter Table

### Sturdy Typewriter Table Built of Pipe and Fittings

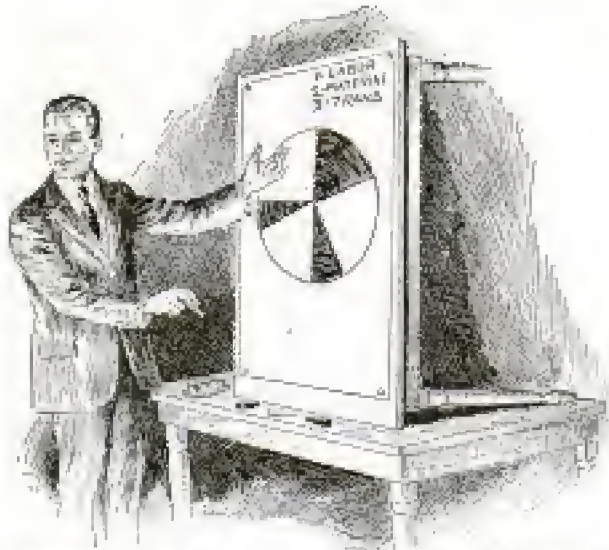
Built of pipe and fittings so that the top comes about 26 in. from the floor, this sturdy typewriter table will be of good service. Floor flanges are used to attach the framework to the underside of the table with screws, and similarly floor flanges, having felt or rubber disks glued on, provide feet that will not scratch polished floors. Tees are used to connect the crosspieces and legs, while a cross fitting holds the former together at the center, as indicated.

### Collodion Mends Holes in Linoleum

Small holes and tears in linoleum can be quickly and permanently repaired with the use of collodion. Apply it to the edges of the holes, allowing it to become tacky. Then press the edges together and place a heavy weight over them until the cement dries, after which a thin coating of it is applied for further protection. If the holes are very small, they can be filled with the cement, which is transparent and will not be noticed.

❶ Soft drinks may be made into delicious frozen cubes by pouring the liquid into the refrigerator cube pan.





Sketching Board for "Chalk Talks" Can Be Quickly Improvised from Two Small Tables

### Speaker's Sketch Board Consists of Two Small Tables

Speakers, sales managers and others who are called upon to talk at clubs, lodges and parties, can quickly form an improvised sketch board by using two small tables, one placed upon the other as shown. This gives a surface at the most convenient height and angle for both the speaker and the audience. One artist uses this method constantly.

### Floor Lamp for Workbench Holds Light in Any Position

It is often rather difficult to hold a light at the proper angle over a workbench. An adjustable floor lamp made from scrap pieces will be found convenient. The base consists of three feet, each 10 in. long, nailed to a triangular center block. A hole, drilled lengthwise in the block, accommodates a 5-ft. length of pipe or rod. A  $\frac{1}{4}$ -in. pipe, with a light socket at one end and the cord running through it, is then attached to a 6-in. piece of  $\frac{3}{4}$  by  $\frac{3}{4}$ -in. bar stock, bent to encircle the up-



right pipe so that it will slide freely. Drill and tap this piece for a setscrew to hold it securely at any point on the upright. The pipe crossarm is fastened to the bar by wrapping both with copper wire and sweating the turns of wire together with solder.

### Brass-Shim Stock Has Many Uses

When a flexible straightedge is needed and a regular one is not available, brass-shim stock will be found a serviceable substitute. This material can easily be bent around curved and other irregular work. Two or three strips riveted together form a handy, flexible ruler, the rivets being peened down smooth. If it is to be used with a ruling pen, the top strip should be a trifle wider than the others, to prevent ink from smearing. For protecting wall surfaces when painting or otherwise finishing interior woodwork, take a strip of shim stock and fasten it to a light piece of wood, such as a lath or old yardstick. This forms a shield, which is held against the wall and along the woodwork where paint is not desired.

### Match Helps Fill Lighter

To prevent spilling when filling a cigarette lighter, hold an unlighted match across the top of the fluid container. The liquid will flow down the match and drip into the lighter with little loss.

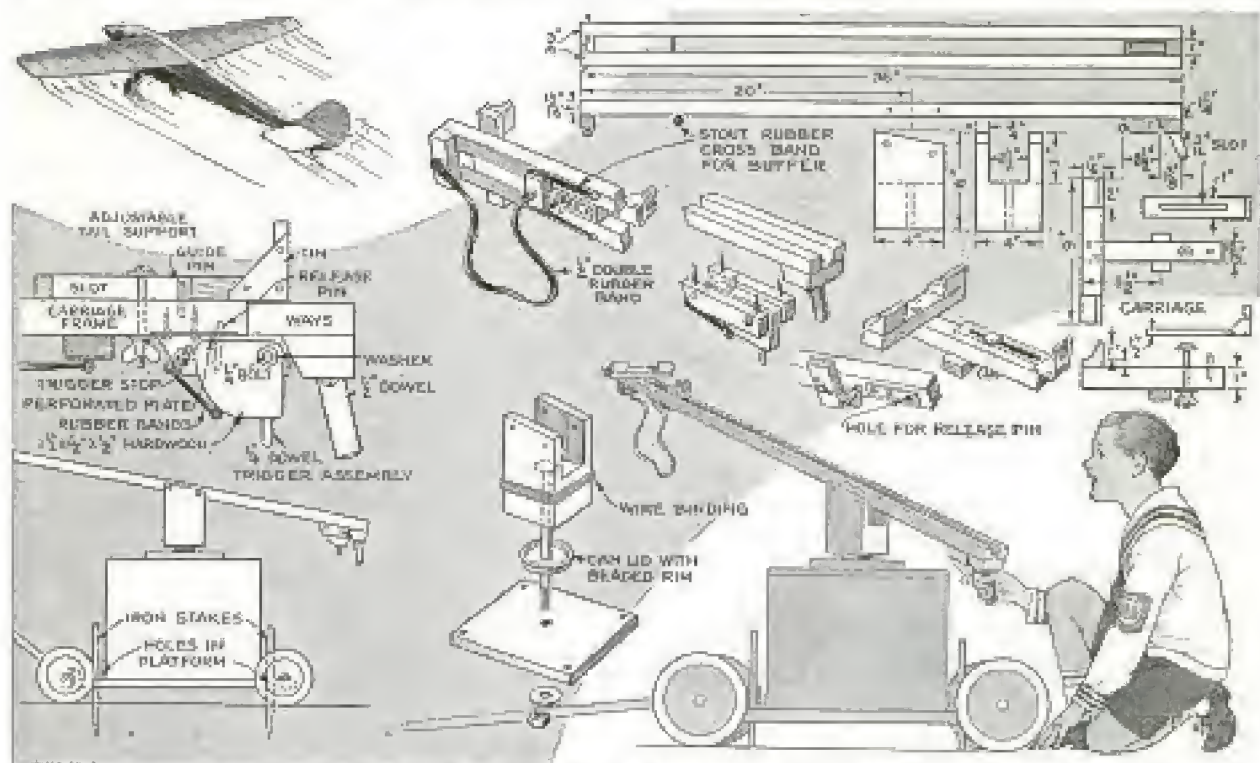


### Switchplate Guard Keeps Wall Paper Clean

Staining wall paper when cleaning electric switchplates can be avoided by cutting a hole in a piece of cardboard to fit snugly around the plate. This makes an efficient guard which may be kept and used as long as it lasts.



## RUBBER-BAND CATAPULT LAUNCHES MODEL PLANES



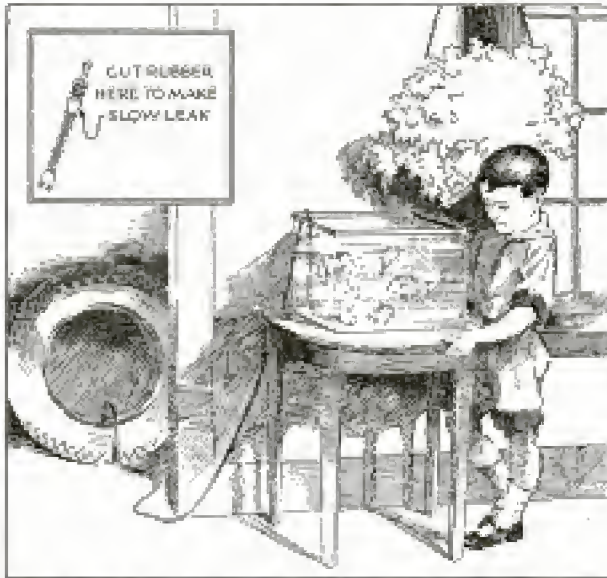
Uniform Launching of Model Planes, Free from the Faults Resulting from Hand Launching. Make This Rubber-Band Catapult an Ideal Accessory for Model-Plane Flyers

In launching model planes, a uniform send-off can be assured with the aid of this rubber-band catapult, which is very easily constructed, and can be mounted on a post, on a truck, or on the bow of a boat in battleship fashion. The swivel block is cut from a single piece of 4 by 4-in. stock, or can be built up from two pieces of  $\frac{3}{4}$ -in. wood and a  $2\frac{1}{2}$ -in. piece between them. A tin-can lid, having a beaded edge, provides bearing surface for the swivel. Make the ways of clear straight-grained hardwood, well sandpapered and waxed. They are  $\frac{3}{4}$  in. wide and  $1\frac{1}{8}$  in. thick, which allows the 1-in. carriage frame to slide easily. A crosspiece keeps them properly spaced at each end. The swivel block keeps the ways spaced near the center although it is located nearer the firing end. The carriage is made of white pine and must be a good sliding fit so that it will travel true. Set in a short piece of sheet metal drilled as shown to receive the release pin. A bolt with a thumbnut allows adjustment of the tail support. Make a hardwood block in the shape shown to carry the trigger-release pin and stop. This swings on a  $\frac{1}{4}$ -in. bolt, and is kept in the center of the ways by means of washers. Two heavy rubber bands, attached to the side frames,

hold it up against the stop. Note that the release pin tilts back slightly. It is merely a nail with the head cut off  $\frac{3}{8}$  in. from the wood and the end filed round. Drill a small hole before driving in the nail so the block will not split. Double rubber bands,  $\frac{1}{2}$  in. wide, provide the force to shoot the carriage forward, but experiment may prove heavier or lighter bands more effective for the particular type of plane you fly. Too much force may send your ship into a loop and, as a rule, model planes do not require much speed in launching. Near the forward end, the location being determined by test, attach a stout rubber band across the underside of the ways to serve as a buffer when the carriage reaches the end of its travel. In the drawing the swivel block is designed for a  $10^\circ$  elevation, but this can be made variable by using it as a fulcrum for the ways, with a single screw in each side instead of two.

When soldering delicate work where it is desired to confine the solder around the joint and prevent it from flowing over other parts, apply a paste of powdered whiting and water around the joint with a brush.





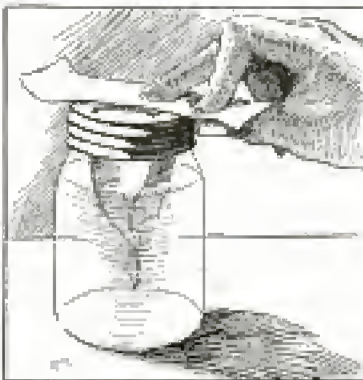
Slow Leak in Old Auto Tire Provides Air to Freshen Water in Small Aquarium

### Inflated Tire Aerates Aquarium

Owners of small aquariums will find an old tire practical for aerating the water, in order to prevent the necessity of constantly changing it. The tire is set in a near-by closet and one end of a length of rubber tubing is connected to the valve stem, while the other end is submerged in the aquarium. In order to get a constant slow leakage of air from the tire, the rubber washer in the valve core is cut slightly. The end of the tubing connected to the valve stem should be fitted with a nut taken from a discarded auto pump. With the provision of such a slow leak, it will not be necessary to restore the air pressure in the tire more often than about every two weeks.

### Wick in Fruit Jar Moistens Labels

Labels, stamps, seals or stickers can be moistened by running the gummed surface over a moistened wick attached to a screw-top fruit-jar lid. After removing glass inside of the lid, cut or punch two slots through it as shown, to receive an ordinary lamp wick. This is



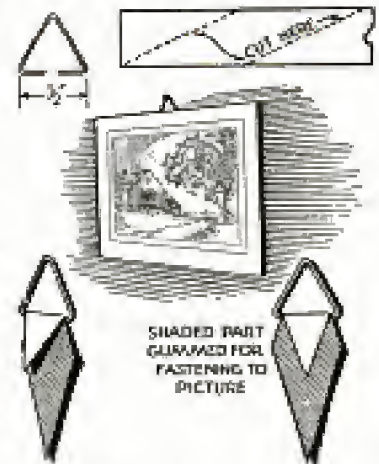
threaded through the slots, its ends dipping into the water with which the jar is filled. As long as there is sufficient water in the jar, the wick will be moist.—Wm. J. Douglass, Missouri Valley, Iowa.

### Removing Old Bearing Liners

Many automobiles are made so that main-bearing liners can be replaced without removing the motor. As a rule, the bottom half of the bearing is anchored in the cap, but is readily removable and the upper half is generally renewed by revolving the old liner one-half turn so it can be dropped down. To remove the old liner, press a taper pin lightly into the oil hole in the crankshaft, and cut the pin off so that it projects about  $\frac{1}{2}$  in. With this pin in place, rotate the crankshaft one-half turn and the liner will be out. When putting in the new liner, the same method can be used.

### A Hanger for Wall Pictures

For hanging pictures, a simple device consists of a piece of wire about 2 in. long, bent to the triangular shape in the upper detail, and a piece of gummed paper or cloth about  $\frac{5}{8}$  in. wide, cut to diamond-shape. Moisten one end of this strip and slip it through the wire triangle. Press the end over against the center of the diamond and paste the remaining part to the back of the picture.



### Durable Tags for Marking Plants Made from Linen Cloth

Durable plant-marking tags can be made from linen cloth cut into pieces of suitable size. Use a round-pointed pen and India ink for marking them. Then dip each tag in a solution of paraffin and benzine, which provides a waterproof film over the surface.



# SHOP NOTES

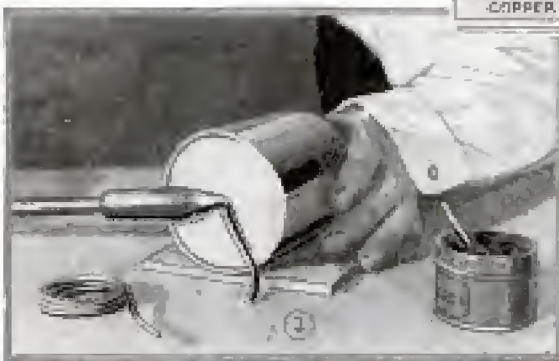
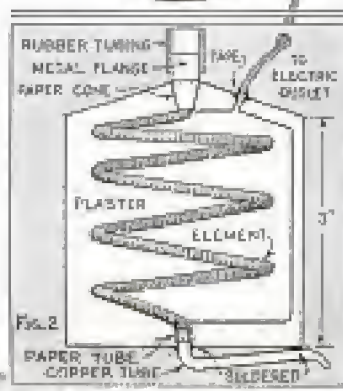
## Electric Water Heater Works Instantly

**B**ESIDES being an interesting job for the home craftsman, an electric water heater, which is attached directly to the faucet, is worth having, especially during the summer months. It consists essentially of a resistance coil laid in plaster of paris, the water from the faucet passing through the coil, which is heated by an electric current. With the current turned on, water is hot when it comes out at the lower end.

First solder together a metal can, about 3 in. in diameter and 3 in. high. Nickelplated zinc, brass or galvanized sheet metal, obtainable at tin shops, may be used for the purpose. Drill a small hole in center of the bottom and solder into it a 3-in. length of  $\frac{1}{4}$ -in. copper tubing, bent to the shape shown in Fig. 3. This tube should project about  $\frac{1}{8}$  in. inside of the can, and is also soldered to the edge to increase its strength. A cone-shaped lid to match the can is then made, the apex terminating in a metal sleeve or flange, and a hole is drilled in the lid to receive a small hard-rubber bushing

commonly used on electric sockets, where the cord enters. The lid is not soldered to the can until last. The heating element consists of 20 ft. of No. 34 nichrome resistance wire, wound on a  $\frac{1}{4}$ -in. rod with the turns as close together as they are in a screen-door spring. After winding the coil, slip it off the rod and run it through a collodion bath, as shown in Fig. 1, taking care not to get any collodion in

the open ends. This treatment virtually makes a waterproof tube out of the coil. If collodion is not obtainable, several dippings in ordinary lacquer will serve the same purpose, each coat being allowed to dry before applying the next. When dry, thread the coil on a length of copper wire, bent to a helical shape, which can be done by wrapping it around a bottle,  $2\frac{1}{2}$  in. in diameter. In doing this, be careful not to crack the layer of collodion or lacquer, and if this is accidentally done, a new coating must be provided over any part that has been bruised.







An Electric Water Heater That Fits on the Faucet

Flexible rubber-covered leads of an extension cord are connected to the ends of the heater coil, as shown in Fig. 2, a few turns of the latter being unwound from the ends and scraped clean to insure a good electrical connection. You cannot solder the ends together, but must only twist them securely. The ends of the heater coil are bent so that they will fit short paper tubes at the inlet and outlet ends. With the coil and leads placed in position, as indicated in Figs. 2 and 3, so that none of the coils touch another, the side of the can, or the projecting end of the copper tube, plaster of paris is poured in completely around the resistance element. The paper tubes prevent entrance of the plaster into the coil. After it has hardened, the copper wire inside of the coil is pulled out and the lid is then soldered to the top edge of the can, as shown in Fig. 4. If the surface of the can is nickelplated, the plating will have to be scraped off the extreme top edge to enable the solder to adhere.

With a plug and pendant switch on the extension cord, the heater is ready for use. It is attached to the water faucet by means of a 1½-in. rubber nipple, and the current is turned on to burn the collodion coating off the coil, which takes only a few seconds. Turn off the current and allow the coil to cool again, after which the water is turned on and then the current. The temperature of the water is governed by the amount passing through it. In a very small stream, the water will become steaming hot. It is important to remember that the water must always be turned on before the current, and the current off before the water. This will preserve the element and make it last longer.

### Cleaning a Car for a Paint Job

Freedom from dust is the most important point to observe when a car is to be painted. After sanding or rubbing down the old surface, dust the car thoroughly with a brush. A thin coat of shellac is run in all cracks, seams and rust spots, to set particles of dirt that have not been removed, but which will drag out with the brush when you are coating it. Take a good wad of cheesecloth, about ½ yd. square, and pour enough rubbing varnish on it to dampen it entirely. Squeeze the rag, and wring out all varnish you can, then shake out and allow to dry a few minutes. With this sticky cloth go all over the surface you are about to paint or varnish, in order to pick up all loose dust that has not been removed by brushing. This procedure is highly important and should not be neglected. It helps make a real paint job. Treat each coat thus before applying the next.

### Old Dirt Scoop Cleans Out Coal Car

It is usually rather difficult to clean out the small quantity of coal, wheat, or other



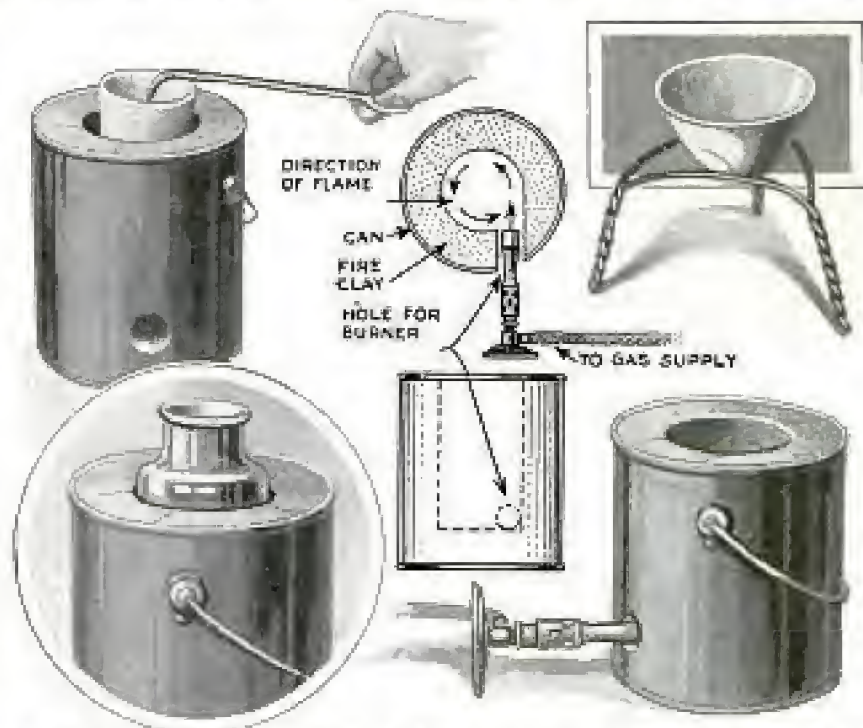
Scraper for Cleaning Ends of Box Cars Made from Dirt Scoop Fitted with Handles

loose material left in the ends of box cars. By providing an old dirt scoop with a pair of suitable handles, from an old plow, for instance, a handy scraper can be made for this purpose. It can also be used to advantage for picking up rubbish around the ground.



## A GAS-FIRED MELTING FURNACE FOR SMALL SHOPS

There are many operations encountered in the small shop and laboratory where a rather high temperature is needed to melt small batches of metals, make chemical fusions, incinerations, and the like. Such a high temperature cannot be obtained from an ordinary Bunsen burner, gasoline torch or alcohol lamp, as the heat radiated from the object is very great. A small, thermally insulated furnace, using one of the comparatively recent Mekker-type of Bunsen burners as the fuel supply, is not difficult to make and is shown in the accompanying photographs. The shell of the furnace consists of a 1-gal. paint can, thoroughly cleaned with turpentine. A floor or bottom of fire-clay paste is poured into the can to a depth of 2 in., and a bottle is placed on this flooring and centered in the can. More of the fire-clay mixture is then poured around the bottle to form the walls of the furnace. When the clay is somewhat hard but still plastic, the bottle forming the core is removed and the hole for the burner is cut through the can and the fire-clay wall. If desired, the hole may be cut before the clay is poured in and the hole then temporarily closed with cardboard, preventing the clay from running out. The furnace should be dried in a warm place until thoroughly hard. The Mekker type is designed to burn a more explosively proportioned gas than the ordinary Bunsen burner, and it will therefore give a higher temperature. The burner should not fit snugly in the hole, for some air must be admitted to the furnace at this point. In heating small porcelain crucibles they can be supported on a little tripod made from nichrome wire bent as shown in the upper right-hand detail. The tripod is set on the floor of the furnace. A large crucible of the Hessian sand or fire-clay type is very satisfactory for melt-



For Melting Small Quantities of Metal, This Homemade Furnace Makes Use of a Mekker-Type Burner

ing batches of metals for soft and even hard solders, and the like. A pair of tongs, made from heavy wire, will serve to remove the crucible from the furnace for pouring. It should be noted that the flame is directed into the furnace on a tangent with the inner walls, thus encircling the crucible and heating it evenly throughout. Cracks in the furnace can be patched with fresh fire clay.—Raymond B. Wailes, Bethesda, Md.

### Shield Keeps Dirt Out of Shoes

Those who work in the garden or on the farm will find the illustrated shield effective for keeping sand and dirt out of the shoes. It is cut from an old inner tube to the shape shown in the detail. After slipping it over the shoe to cover the lacing, the band section is pulled up around the top of the shoe to keep the shield in place.







A Sliding Hammer and Drill Reduces the Task of Drilling Holes through Brick and Concrete

### Sliding Hammer on Star Drill Speeds Up Work

Drilling through brick and concrete will be found comparatively easy and can be done quicker, with the illustrated tool, which is actually a hammer and a drill. It consists of an 18-in. length of pipe into one end of which a socket is riveted to take the drill, a setscrew being provided to hold the latter in place. The outside diameter of the drill socket should be the same as that of the pipe, while the shank is turned down to fit inside of the pipe. A hammer of suitable weight is drilled and tapped for a  $\frac{3}{4}$ -in. steel rod, which in turn is threaded to fit the hammer. To use the tool, slip the rod into the open end of the pipe, and proceed to slide the hammer back and forth, striking it against the pipe. The effect is the same as if the drill were struck directly with the hammer. By knurling the hammer it will not slip in the hand. A cloth wrapping around the hammer will reduce the shock.

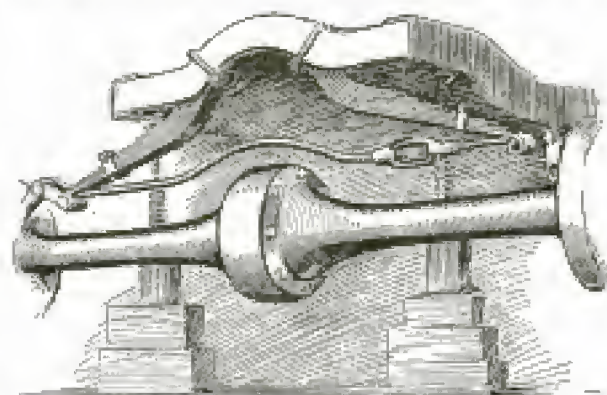
### An Effective Trap for Moths

A trap for moths that has proved of great assistance to South African farmers, is made of a 5-gal. oilcan and some wire screen. The base of the can is cut off about 1 in. from the bottom and portions of the edge on each side are bent slightly outward. The top of the can is then replaced on the base, the bent-out

flaps forming gaps through which the moths can enter. Inside of the can, about one-fourth of the way up, a piece of wire screen is fitted, sloping upward from each side to form a ridge in the middle. A number of holes are cut in the ridge. The lid of the can is replaced by a tight-fitting piece of screen. To attract the moths, any alcoholic-smelling fruit or vegetable is placed on the bottom of the can. Melon or tomato, preferably rotted, over which a mixture of about half a teaspoonful of vinegar, half a teaspoonful of water and half a teaspoonful of sugar, have been poured, is a particularly effective bait as this accentuates the alcoholic smell. The moths enter through the openings at the base. From the lower portion they go through the holes in the ridge into the upper section of the trap. Because the holes are at the apex of the ridge, from which the wire slopes steeply downward, the moths cannot get back to the lower section.—A. Durston, Bloemfontein, South Africa.

### Rod with Turnbuckle Spreads Auto Springs

Auto springs can be held apart when disengaged from the shackle bolts by means of a simple rod-and-turnbuckle jack. Two pieces of  $\frac{3}{4}$ -in. steel rod, one longer than the other, are threaded at one end to receive a suitable turnbuckle, while the other ends are ground to a blunt edge. The longer rod is bent to go around the rear-end housing. In use, the ends of the assembly are placed behind the eyes



Tool for Holding Springs Apart Consists of Two Lengths of  $\frac{3}{4}$ -In. Rod and a Turnbuckle

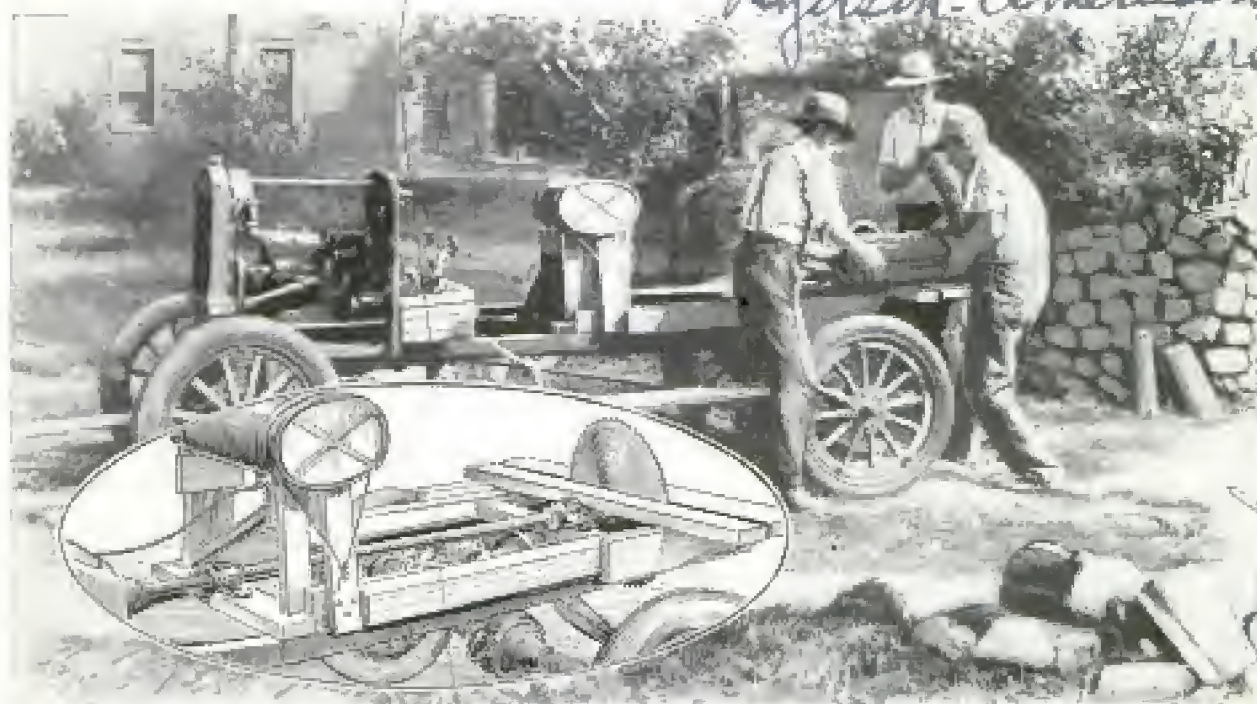
of the spring and the turnbuckle is then rotated to force the springs apart.—Avery E. Granville, Cleveland, Ohio.



*Shaft from junk yard  
or company selling steel rod.  
1041  
Myerson-American Steel  
Here*

## POPULAR MECHANICS

### AUTO MOTOR SUPPLIES POWER FOR THE BUZZ SAW



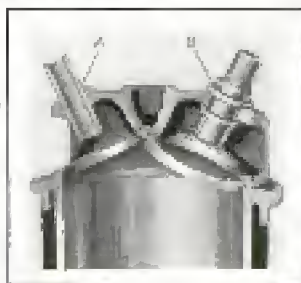
Mounted on an Old Auto Chassis, a Powerful, Portable Buzz Saw Can Be Made at Slight Expense, as You Have to Buy Only a Shaft and Two Bearings

Farmers having an old auto chassis on hand, or those who can readily obtain one, will welcome the idea of converting it into a portable buzz saw, with ample power for all work on the average farm. The old driveshaft is removed and a new shaft substituted. One end is turned down to form a shoulder and threaded to take a nut, to hold the saw in place, or any other suitable method of attaching the saw securely without danger can be followed. The new shaft is attached to the universal joint in the same way as the old shaft, but it is, of course, necessary to square the end

to fit the universal joint. Two bearings are attached to wooden crosspieces bolted to the frame, while the gasoline tank is perched on a wooden cradle. Two wide hardwood boards, laid across the frame on either side of the saw and bolted down securely, the heads of the bolts sunk flush with the upper surface, form the saw table. A helper can regulate the gas supply to accelerate the motor under a heavy cut, although a governor to control the speed uniformly under such variations will be found highly useful.—A. W. Paulson, Rock Falls, Ill.

### Replacing Valve Seats and Guides in Airplane Motors

It is no longer necessary to junk OX5 and OXX6 airplane cylinders because of difficulty in replacing valve seats and guides, which are cast integral with the cylinder head. When the guides become so badly worn that the motor fails to function properly, merely break off the guide at A and ream out the opening



with a drill slightly larger. This will enable the mechanic to install a new guide, which is held in place with a double-flange collar B. Care must be taken to get a perfect alignment. The removable guides can be similarly replaced when they become worn, thereby extending the life of the cylinder in appreciable measure.—Winchell A. Royce, Chicago.

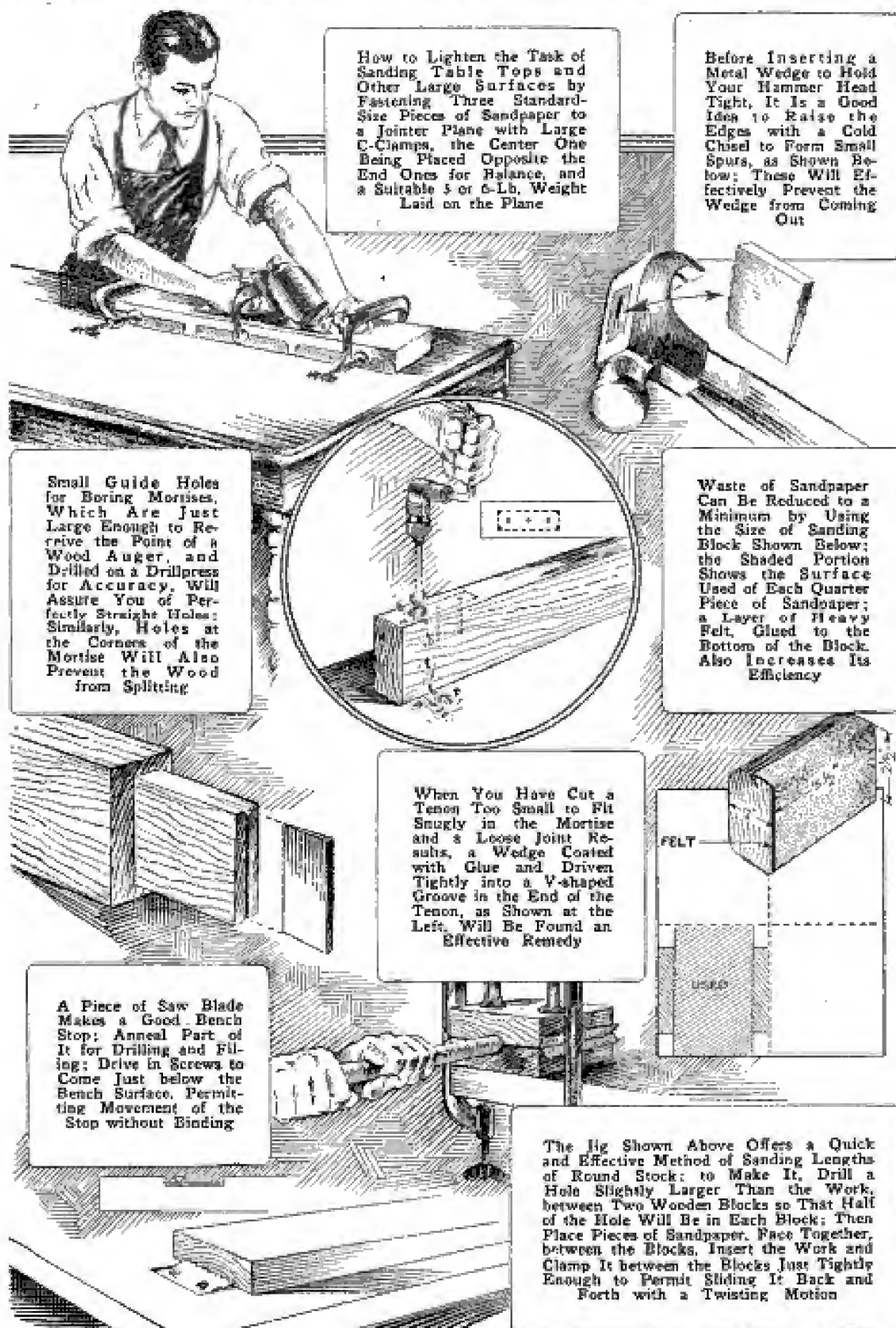
Government tests show that wood dust is more easily ignited and produces higher pressure than some of the grain dusts, which have wrecked a number of factories by exploding.

*Dept. of Agriculture  
Copyrighted material  
engineers*

*LA Church, Rock Falls, Ill.*



## WOODWORKING IDEAS THAT SAVE TIME AND LABOR





### Mark on Bolt End Shows Position of Cotter-Pin Hole

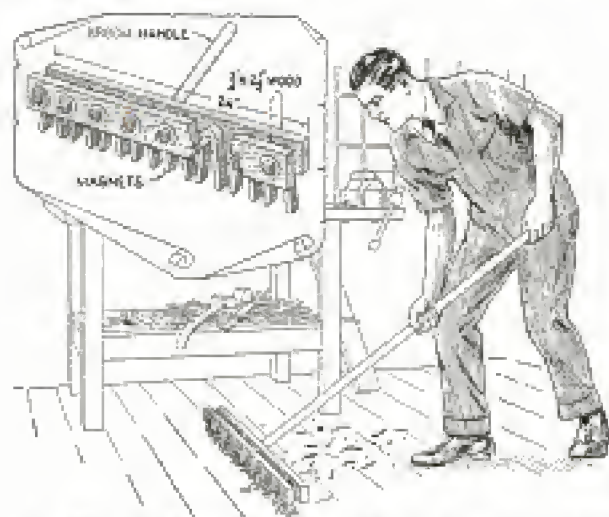
When overhauling an auto engine, cotter-pin holes in bolts are often filled with grease and dirt, which makes them hard to locate when the nut is driven on. By marking a line parallel to the hole across the end of the bolt with a file or small cold chisel, taking care not to damage the threads, the exact position of the hole can readily be ascertained, and much time will be saved in inserting the pins.—Chas. Kaufmann, Santa Ana, Calif.

### A Good Substitute for Enamel

If ready-mixed enamels of the desired color or shade are not available, and tinting to shade cannot be done conveniently, the following method will usually serve the purpose: Get a good flat wall paint of the right color, pour off the liquid before stirring it, and then stir in enough good interior varnish until the proper brushing consistency has been reached.

### Magnet Rake Picks Up Nails

For picking up nails, tacks and other small iron scraps, a magnet rake will save much time. Old Ford flywheel magnets serve as the teeth, being bolted about 3 in. apart between two pieces of  $\frac{3}{4}$ -in. stock. A hole is drilled through both of these pieces at the center to take the end of a broomstick, which forms the handle. When not in use, a soft-iron bar should be kept across the legs of the magnets to retain their strength.



This Magnet Rake Picks Up a Large Quantity of Iron Scraps in a Few Minutes



Homemade Poultry-Watering Trough Has a Revolving Rack to Keep the Fowls Out

### Auto Gas Tank Used for Poultry Watering Trough

A watering trough that will keep chickens and other fowls from climbing into it and getting the water dirty, can be made from a discarded round or oval gas tank. Cut the tank in two about 6 in. from one end, leaving two strips of the metal projecting about 3 in. above the edges as shown. Then make a roller consisting of two wooden disks with four laths nailed across them, the length of the roller being slightly less than the distance between the lugs on the tank. Drive a nail through each lug and into the center of the roller, so that the latter is free to rotate. The motion will keep the fowls from perching on the roller.

### Sizing on Plaster Patches

When repairing cracks in painted plaster walls, it is important to coat the patch with size or varnish before painting, otherwise it will be plainly visible. Sizing is essential regardless of the kind of material used for patching.

### To Insulate Copper Wires

Copper wire can be insulated satisfactorily by dipping it in a thick solution of raw rubber and benzine. If the wire is not to be subject to excessive bending, it may be painted with a thick solution of carbon disulphide and hard rubber.





Combination Clamp and Holder for Supporting Round Stock on the Drill-Press Table

### A Holder for Drilling Round Stock

For drilling round stock, a combination clamp and holder will be found convenient. The one shown here consists of two pieces of steel plate, cut and bent as indicated. The two parts are hinged together so that, when the clamps are set on the drill-press table, the jaws will hold the work securely.

### This Counterweighted Hook Is Self-Releasing

Handling a hoist rope single-handed can be simplified by using a counterweighted hook which releases itself from the handle of the bucket automatically when the latter reaches the ground. The hook is bent as shown, the eye near the



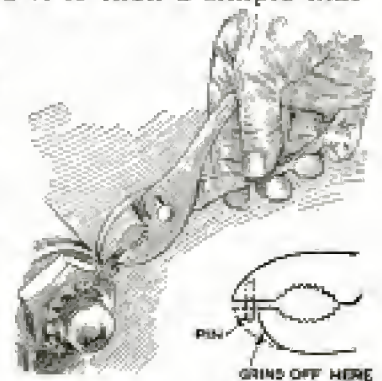
center being slipped over the hook on the hoist rope. The weight of the pail holds the counterweight up, but as soon as the load on the hook is removed, the counterweight falls over and disengages the hook at the lower end.

### Heat of Burning Gasoline Loosens Old Tire Patches

When it is difficult to remove an old patch in case a new puncture is so close to it that a separate patch can hardly be applied and it is advisable to use one large patch to cover both holes, do not attempt to tear off the old patch, which might result in injury to the tube. Try the following method: Apply a little gasoline to the old patch and ignite it. The heat of the burning gasoline will loosen the rubber sufficiently to enable you to pull it off without any trouble whatever.

### Cotter-Pin Extractor Made from Pliers Is Handy Tool

Garage mechanics will find the illustrated cotter-pin extractor, made from a pair of ordinary pliers, one of the handiest tools in their kit. One jaw is ground down as indicated, and a hole drilled in the flat of the other jaw to take a small pin. In use, the pin is inserted in the eye of the cotter and it is then a simple matter to pull it out. The pin will not slip out of the eye as the head of the cotter is securely held between the jaws. —J. L. Gallagher, Detroit, Mich.



### Inner Tube Holds Hot Water for Bending Wood

During the construction of a glider, I found it necessary to bend some strips of wood,  $\frac{1}{4}$  in. square and 5 ft. long. From an old inner tube a piece, about  $6\frac{1}{2}$  ft. long, was cut. One end was tied tightly with heavy string, and the strips of wood were placed in the tube. Boiling water was then poured in, completely covering the strips. The rubber covering keeps the steam in, and the wood receives the effect of both soaking and steaming. An immersion of 10 or 15 minutes was found long enough to make the wood pliable.—Jack Quarry, Brooklyn, N. Y.



# A Septic Tank for Farm and Cottage

by W.A. Whitfield

HERE is a septic tank of simple construction for farm or cottage providing all the advantages of a complete and effective sewage-disposal system. With its installation you may have all the plumbing accessories of the modern home. It will take care of your sewage for five or six years without attention, although periodic inspection is advisable.

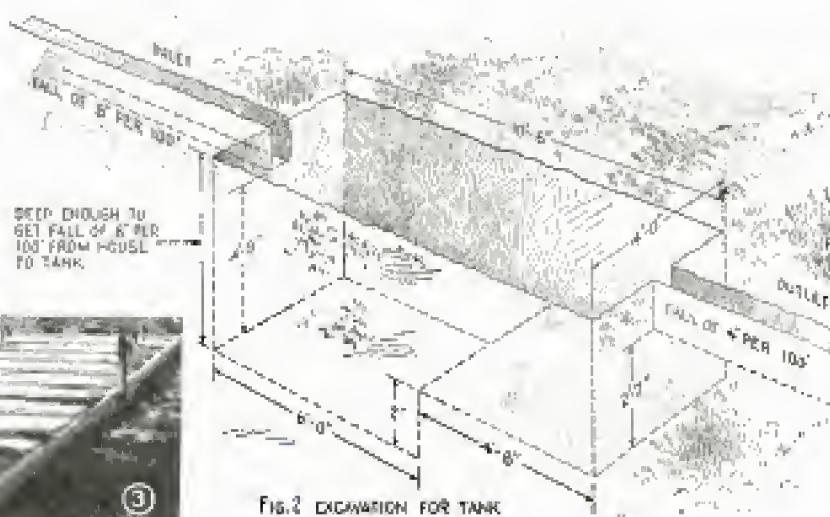
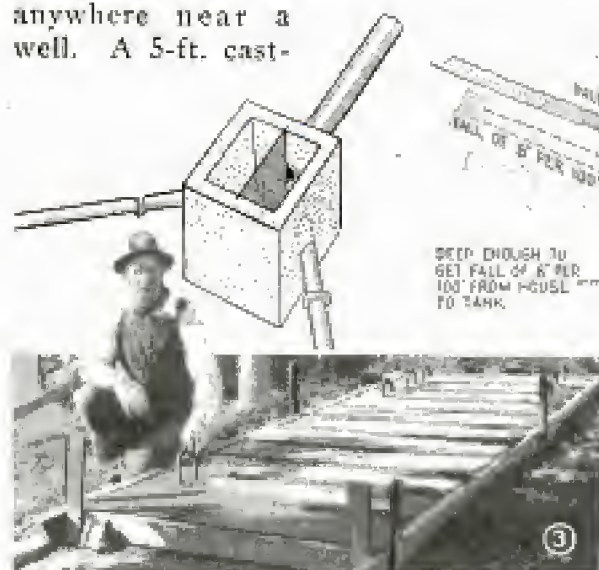
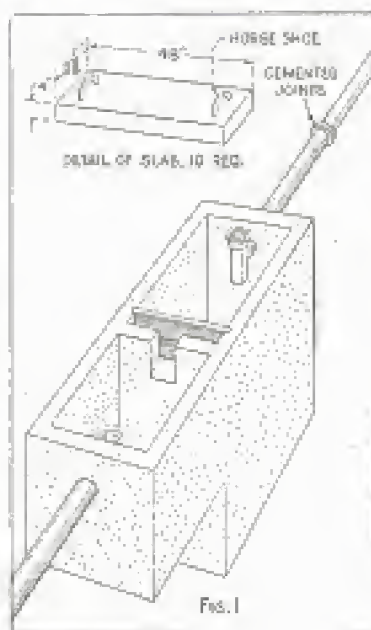
The tank described is sufficiently large for average needs, but a larger one may be constructed if desired. It should have a capacity of about 50 gal. for each person. The tank acts as a settling chamber where the solids in the sewage are decomposed and changed to liquids and gases. As the sewage enters the tank, the solids sink to the bottom where most of them are decomposed by bacterial action. The greases rise to the top and form an air-tight blanket.

The system consists of two separate units: the settling tank and the absorption field. The settling tank is shown in Figs. 1, 5 and 10. It should be placed from 40 to 50 ft. from the house and the absorption field must not be anywhere near a well. A 5-ft. cast-

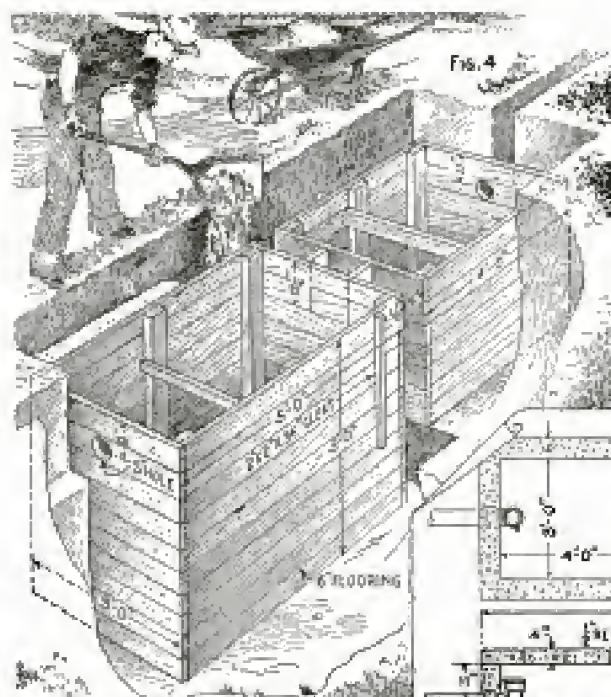


iron soil pipe should be used where the drain passes under the house foundation to prevent the system from being clogged

owing to a broken tile under the foundation, the weight of which may cause such trouble. The pipe to the settling tank should slope 8 in. per 100 ft. If the tank is located in firm earth that is not likely to cave in, the wall of the pit will serve for the outside form as shown in Fig. 2, where all dimensions are given. In this case, the excavation should be the same size as the outside dimensions of the tank. If the earth is loose both an outer and an inner form will be needed. The interior form is placed







**BILL OF MATERIAL FOR TANK AND DIVIDER**  
 20 BAGS OF CEMENT, 4 CU. YD. OF SAND  
 TWO 4" SANITARY TEES  
 80' 3" 4" REINFORCING RODS CUT IN 4 FT. LENGTHS  
 150' TO 200' OF 4" DRAIN TILE  
 4" VITRIFIED SEWER TILE TO CONNECT HOUSE AND TANK

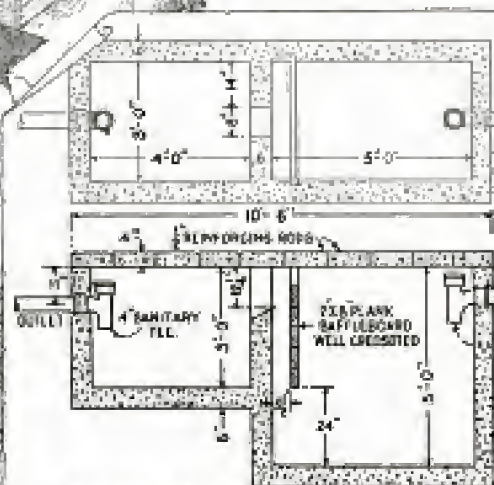


FIG. 5 PLAN AND ELEVATION OF TANK

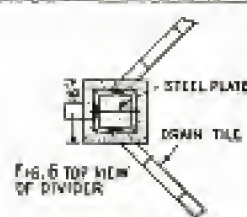


FIG. 6 TOP VIEW OF DIVIDER



FIG. 7

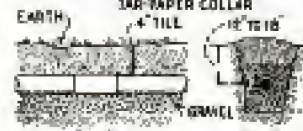


FIG. 8

FIG. 9

so that the bottom is 6 in. above the bottom of the excavation, thus allowing the concrete floor and walls to be poured at the same time. It is easier to smooth the floor of the large part if a board is nailed at the bottom of the form, on which to stand while smoothing the floor. The depth of the tank beneath the surface of the ground will vary, depending upon the depth of the cellar of the house. If the cellar floor is more than  $3\frac{1}{2}$  ft. below the ground level, the drain pipe should go through the wall, rather than through the floor. The settling tank should be deep enough to allow a fall of 8 in. per 100 ft. The concrete should be "slushy" so that it will fill up the forms solidly. The cover for the tank is made up of reinforced concrete slabs provided with horseshoe handles to facilitate lifting. They are made 4 ft. long,  $12\frac{3}{4}$  in. wide and 4 in. thick, as shown in Figs. 1 and 3. In constructing the tank, the 4-in. sanitary tees are set into the concrete, which is done before

The absorption system consists of a sewage divider and one or more lines of 4-in. drain tile laid with tar-paper sleeves over the joints to keep out seepage water. A minimum of 100 ft. of drain tile should be used in any installation. As a rule, 25 to 50 ft. are required per person, although sandy soil requires less tile than clay. The fall of the tile in the absorption system should be 4 in. per 100 ft. Special care should be exercised in preparing the trench for laying the

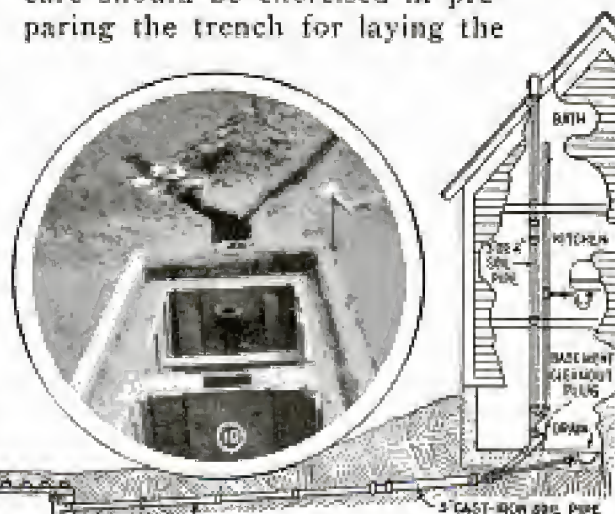


FIG. 11



tile. Gravel the bottom of the trench and lay the tile with the desired slope. Much of the success of the septic tank depends upon the care with which this is done. Fine gravel is used around the sides and over the top of the tile, and then the trench is filled with earth, as shown in Figs. 8 and 9.

The sewage divider is built of concrete and the size is indicated in Figs. 6 and 7. A steel plate is set across the inlet, which carries the fluid from the settling tank and the branches of the absorption field, if there are two, run into opposite sides of the divider. This will, of course, not be necessary where only one long tile line is used. All tile in the absorption system should be laid in the garden, orchard or to the rear of the house. Fig. 10 shows a completed settling tank before the inner forms were removed, and Fig. 11 shows the arrangement of the entire system.

### Can Scraper Prevents Waste of White Lead

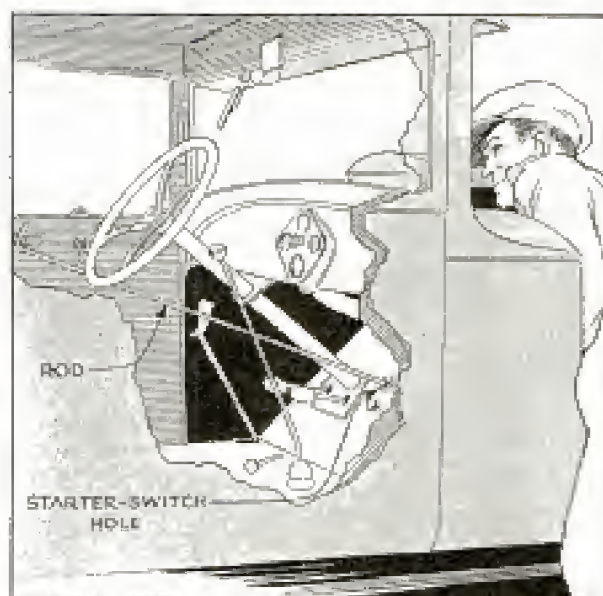


White lead sticking under the rim of a can is usually wasted as it cannot easily be reached. This can be avoided by cutting a notch in a paddle, and using it to scrape the sides directly under the rim as shown.

### Cheap Blackboard from Lampblack and Keen Cement

In a small schoolhouse where blackboards were needed, but the cost of slate was prohibitive and paper blackboards were not desired, a good substitute, which has given entire satisfaction, was found in keen cement blackened with lampblack. This was applied over a layer of concrete which had set but was not thoroughly dry. The surface of the blackboard coating was troweled down smooth and provided an excellent writing surface.

### Iron Rod Opens Locked Auto Door

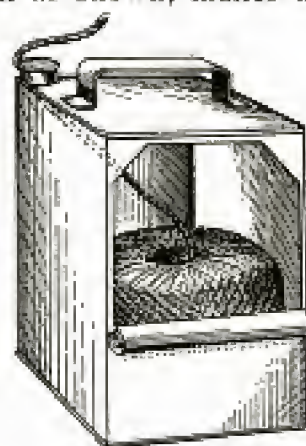


Emergency Method of Opening Locked Auto Doors from the Outside with an Iron Rod

Auto doors can be opened, when the key has been lost, by means of an iron rod, about  $3\frac{1}{2}$  ft. long and bent at right angles 3 in. from the end. On some cars the starter switch can be unscrewed and the rod inserted through the hole to reach the door handle, while on others it can be inserted through the hole for the clutch or brake pedal.

### Portable Container Keeps Twine from Tangling

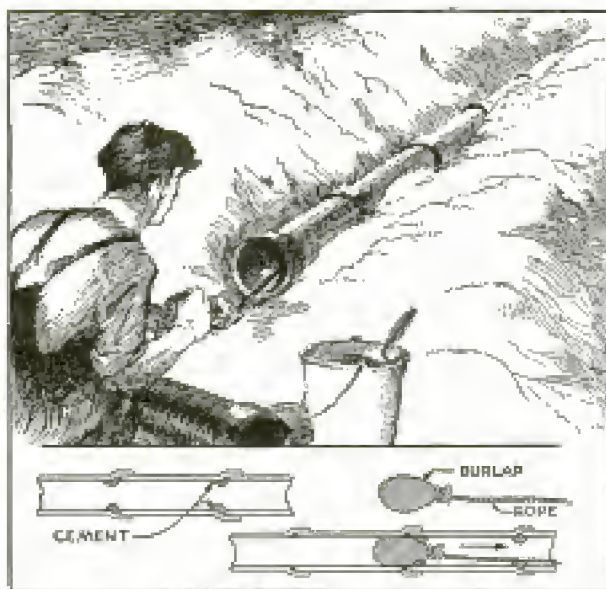
An empty 5-gal. oilcan, with one side cut and rolled down as shown, makes a useful twine holder around the farm, factory or home, and being provided with a handle, it is easy to carry about. If desired, a cork may be inserted in the spout to hold the twine from slipping back.



¶For feeding paper into a multigraph machine, ordinary rubber finger tips are used, but if these are not available a good substitute is rubber cement applied on the finger ends and allowed to dry.



### Burlap Wad Swabs Out Sewer Tile

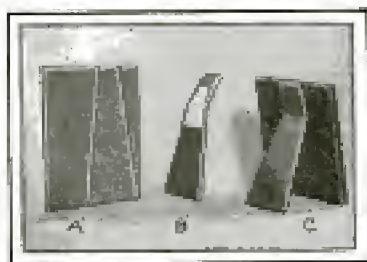


Burlap Wad Makes Good Swab to Remove Surplus Cement from Tile Joints

Cement that has squeezed between the joints of sewer tile should be removed before it hardens. This can readily be done by means of a swab made of old burlap tied to the end of a rope. As each tile is laid, pull the swab up to the opening and thread the rope through another tile which is to be cemented on next, carrying on this process as you go along.

### Cardboard Easels Support Small Picture Frames

In a small photographic studio, it is sometimes quite a problem to keep a large stock of small easel-back frames on hand although customers may desire any size. To avoid losing a sale, you can make cardboard easels for ordinary picture frames, which are neat and entirely suitable for the purpose. Take a sheet of heavy cardboard that is exceptionally tough and pliable, and hold



it against the back of the frame, marking it where it is to be cut, as indicated in detail A. Trim it down with sharp shears or a print trimmer. Then bend over the square edge about one-third of the distance from the top and apply a piece of adhesive tape over the

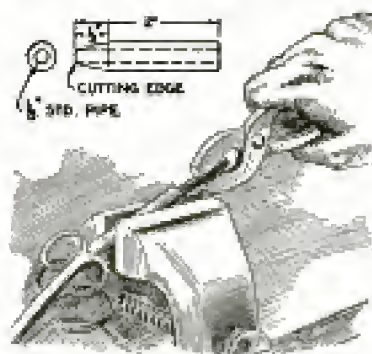
bend, as in detail B. Stain the cardboard to match the frame and attach it to the latter by applying glue to the short portion. Then drive two or three small brads through the top of this part and into the top edge of the frame. The completed easel is shown at C.

### Vacuum Cleaner Blows Dirt from Surface to Be Painted

A good paint job is possible only when dirt is kept out of the paint. A vacuum cleaner has been found useful for removing dirt from cracks and crevices. First a brush attachment is used and the machine connected up for blowing, that is, the hose is put on in the place of the bag. After thoroughly blowing out cracks, remove the brush and go over the surface with a damp rag.

### Sharp Pipe Cuts Round Belting

Round belting can be cut from discarded leather belting by means of a length of pipe having an inside diameter equal to that of the belt desired. Grind one end of the pipe at a bevel as shown in the detail and dress it down to a keen edge on a whetstone. Cut off a strip of the old belting and round off one end for a few inches so that it will slip through the pipe, which is held in a vise. By gripping the projecting end of the belting with a pair of pliers and pulling it through slowly, the sharp end of the pipe will shave off the square edges, making a round belt.—J. J. Siekman, Harvey, Ill.



### Testing Bearing Fit on Autos Using Force-Feed Lubrication

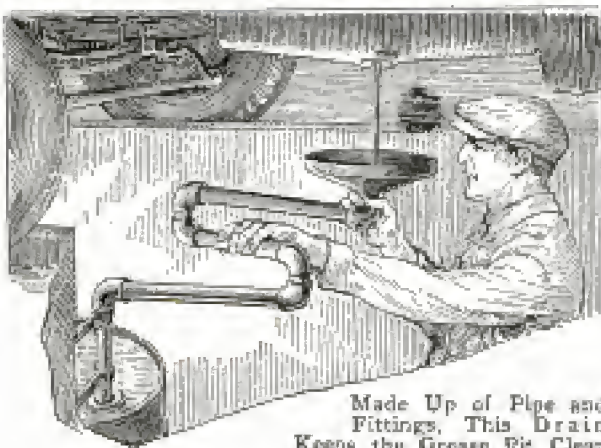
Anyone can make an accurate test of the fit of bearings in any car using force-feed lubrication, with equipment made from pipe fittings. Get a 12-in. length of 2-in. pipe, two pipe caps, an old tire valve, a gasoline shut-off cock and a length of



copper tubing. With a leather washer, fit the tire valve to one pipe cap. Have the other cap tapped, and screw the shut-off valve into it. To test the bearings, drop the engine pan and rig a lamp so that all bearings can be readily seen. Disconnect the oil-pressure line and substitute the line from the equipment just made. With the 2-in. pipe standing on end, half fill it with medium oil. Put on the cap and pump up the cylinder. While you watch the bearings, have someone turn on the valve so that oil under pressure in the cylinder is released. Oil should drip uniformly from all bearings. If it runs very fast from any one bearing, that bearing is loose and should be taken up or replaced. If it does not drip from a bearing or two, but does drip from the others, you have a clogged or partially clogged line, which should be cleaned out at once. On most cars that are in good condition, medium oil at summer temperature, under 40-lb. pressure, should drip at a rate of 30 to 40 drops per minute.

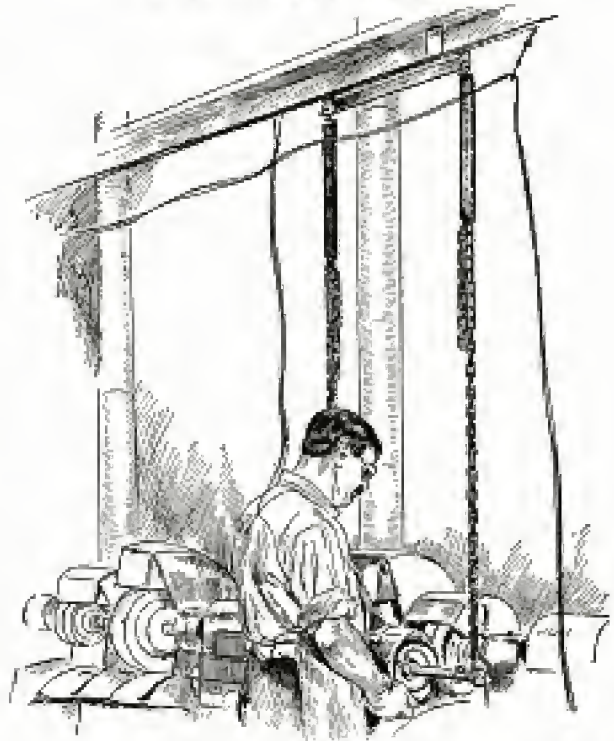
#### Movable Drain Keeps the Pit Clean

Crankcase oil can be disposed of by using an adjustable drain of pipe and fittings. Three 2-ft. lengths of 2-in. pipe are laid parallel and are joined with elbows and nipples. An elbow is run onto the open end of one pipe and a funnel welded to the elbow. An elbow is also screwed on the other end of the pipe and a length of pipe run down to the oil drum. The last piece is fastened securely to the grease rack with strap-iron bands and run into the drum to catch the oil. All fittings should be fairly loose so that the funnel can be swung to any position.



Made Up of Pipe and Fittings, This Drain Keeps the Grease Pit Clean

#### Conveyor Holds Heavy Work for Grinding and Buffing



Overhead Trolley Fitted with Coil Springs and Chains Reduces Labor in Grinding Operations

In one shop where heavy work was passed along a battery of grinding and buffing wheels, a great deal of the labor was eliminated by providing a trolley on the ceiling in front of the machines. Coil springs and chains were suspended to hold the work in the most convenient position, the springs providing sufficient flexibility to allow the work to be handled in various positions.—E. Roverscroft, Dayton, Ohio.

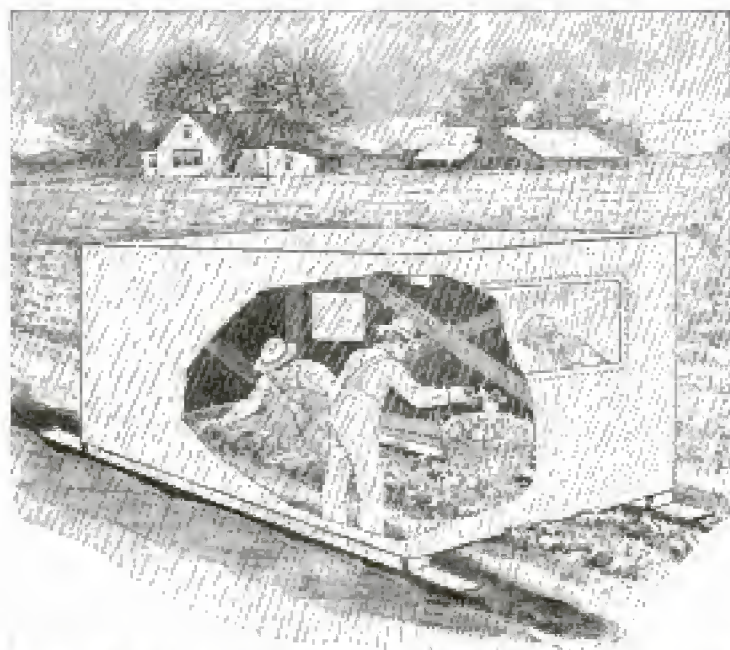
#### A Solution for Ground-Glass Finish

To give glass a ground finish, a solution made of the following materials has proved effective:  $2\frac{1}{4}$  oz. of gum sandrac,  $\frac{1}{2}$  oz. of gum mastic, 24 oz. of ether and 6 to 18 oz. of benzol. The quantity of benzol determines the coarseness of the grain. In using the mixture, flow it over the glass as evenly as possible and let it dry.

#### Alcohol for Priming Camp Stove

On your next camping trip, take with you a small bottle of denatured alcohol for priming the camp stove. It is much cleaner than gasoline, which makes its use preferable, especially when cooking inside of the tent.



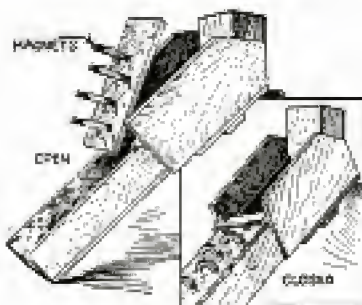


A Flower-Bulb Grower Finds This Portable Tent a Comfortable Protection during Rainy Weather

### A Portable Tent for Truck Farming Protects Workers from Rain

As a protection in rainy weather, a western flower-bulb grower uses a portable tent. It consists of a framework of light lumber with a sloping top to shed water. Waterproof canvas is stretched over the frame and a few celluloid curtains are provided, besides an opening for the door. The width of the tent is such that runners attached to the sides rest in paths on either side of the bed. The same idea can, of course, also be used by truck farmers. If night work is necessary, a couple of lanterns, hung from the top stretchers, will provide sufficient light. The whole tent is light and can be moved by the workers from the inside.

### Magnets Collect Iron in Mill



grains mixed in an overhead hopper pass through a spout into which the ends of a

In order to prevent pieces of iron and steel from getting into the burrs of a feed mill, a magnetic spout has been found effective. The

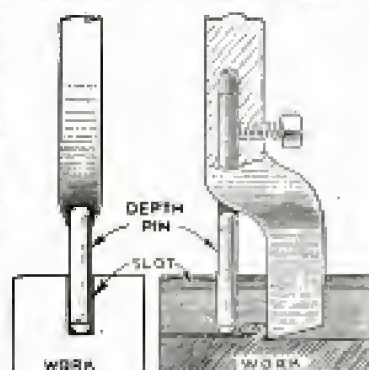
number of old Ford magnets project. The piece holding the magnets is hinged so that it can be swung back for inspection and removal of the iron pieces. Four magnets are shown in the drawing, but three will do as well. If more magnets are used, the spout must be placed at a steeper angle because the magnets have a tendency to retard the progress of the grain.

### Sulphur Fumes Cure Roup

Most poultry raisers' flocks are troubled with roup at some time or other, and this is very hard to eliminate unless every fowl is treated. To do this place an old bucket or other metal container partly filled with live wood coals under the roosts. Close all doors and windows, and put one teaspoonful of sulphur on the live coals every 10 to 15 minutes until the birds begin to wheeze. Then remove the bucket. Apply the treatment every two days for two weeks. It has been found a sure cure if used in the early stages of the disease.

### Regulating the Cut of a Shaper Tool

When cutting deep grooves with a shaper, it is often rather difficult to regulate the hand feed so that an even cut is taken, and there is risk of breaking the tool. For

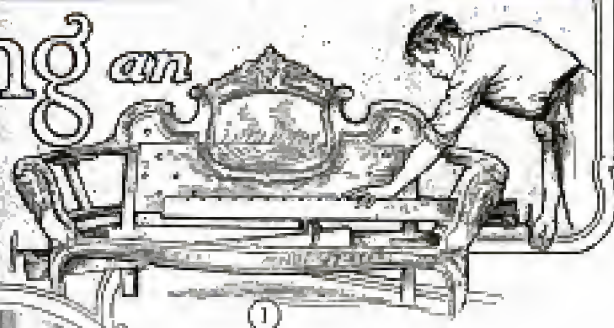


grooves about  $\frac{3}{8}$  in. deep or more, the forged offset tool shown in the illustration has been found useful. It is drilled to receive a round-pointed pin and tapped for a setscrew to hold the pin. The pin is set so that the distance between it and the work equals the depth of cut.

For filing flat surfaces, it is convenient to have a file with the tang bent up at an angle, so that the handle can be gripped, and the hand will clear the work.

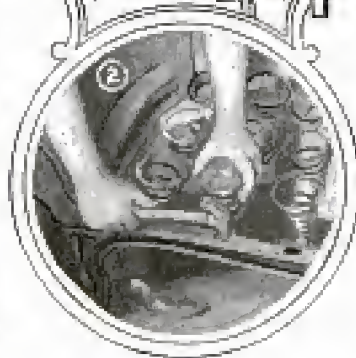


# Upholstering an Old Piece



**M**ANY older pieces of furniture are examples of highly skilled craftsmanship and may be valuable; hence it is worth your while to keep them in good condition, especially the upholstery.

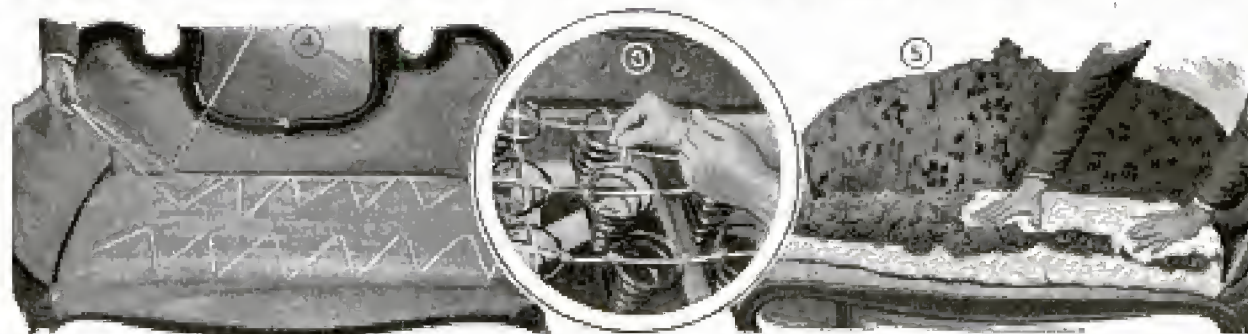
Renewal of upholstery is not difficult for the average home mechanic. The first step is to remove the old covering, the springs, tacks and webbing, and then the frame must be brushed free of dust. When removing the coverings, remember how they were tacked on at the ends and sides with relation to the frame. For example, on the piece shown here the seat covering is pulled underneath the frame of the arms and tacked to the edge of the curved end of the frame, which makes it necessary to cover the seat first, pulling the ends of the seat covering under the arms and tacking it in place before the arm covering is tacked at the lower edge, preparatory to filling it. Also, the end of the burlap undercover must be left loose so that the finish covering can be tacked at the ends. Note the position and type of buttons used, if any. Three kinds of buttons in common use are the loop, clinch and nail types. The first is sewed through the covering and filling, the second is pressed through and clinched at the back on a piece of round fiber, and the last is simply driven through the covering and filler into the frame, being used



where the covering is done over the wood without springs. The first two are most widely used in present-day upholstery. If the frame is loose, clean out all the open joints, apply some glue, draw up with clamps as shown in Fig. 1, and brace

with pieces of hardwood sawed to fit in the corners, locking the latter in place with glue and screws. Fill all deep digs and gouges on the exposed parts with plastic wood or paste filler stained to match. Smooth the exposed surface with fine sandpaper and steel wool and then apply a coat of shellac. Give the unfinished parts a coat of linseed oil and turpentine—a one-to-two mixture—to preserve the wood.

Measure the frame for the burlap and coverings. A wide range of materials, colors and designs is available in outer coverings, such as tapestries, mohairs and velours. When measuring, remember to make ample allowance for the filling on the width and length of the covering. As the covering generally comes in 54-in. widths, a yard of the material will cover a good-sized cushion seat. Order the same amount of burlap. Various fillers may be used. Curled hair, which is the most expensive, makes a springy cushion that will retain its resiliency for the life of the cov-







The Filling Must Be Distributed Evenly

erings. Hair should always be used in the type of cushions of pieces such as shown here. The filler should be rolled between layers of cotton felt to prevent the hair from working through the covering. The springs of most old pieces are sewed or tied individually to webbing, which is tacked to the lower edges of the frame. Bar springs, like those shown in Fig. 2, should be fitted, the ends of the bars being nailed to the frame about 7 in. apart. The springs are then tied together across the top, Fig. 3, using upholsterers' spring twine. Tie the springs the long way first and nail the twine to the frame at the ends, using heavy tacks. Then tie the springs crosswise. Where the spring projects more than 3 in. above the top of the frame, the first knot is tied on the second coil instead of the first, to prevent pulling the top of the spring sideways when the twine is tightened and tacked to the frame. Keep the twine taut but not too tight between the sides of each coil of a spring as well as between adjacent springs. If the springs are pulled down tight with the twine, their combined pressure causes excessive tension likely to loosen the tacks.

After the springs have been tied, cover the seat with burlap, attaching this to the frame with upholsterers' tacks spaced about  $1\frac{1}{2}$  in. apart. Keep the edge of

the burlap rolled under or the tacks will pull out. Pull it fairly tight and make sure that it is evenly drawn. If the arm construction of the piece is similar to that shown in the photo, the burlap must be further supported by three strips of webbing tacked vertically over the arms. The burlap is then tacked over both the inside and outside of the arm framework. Cover all parts of the back that are to be cushioned with burlap, and sew the burlap to the springs as shown in Fig. 4, with a zigzag stitch, using fine twine. Fig. 5 shows how the seat cushion is filled. First tack the covering at the back with 6 or 8 tacks. Then place a layer of cotton felt of 1-in. thickness over the burlap. Spread the filler evenly over it and cover with a second

layer of cotton. The filler should be at least 6 in. thick for a seat cushion of this size, and slightly more will do no harm, as it will be compressed by the covering. Fill out the front, back and ends evenly with layers of the felted cotton and carefully bring the outer covering in place and trim to size, making allowance for folding the edge when tacking. Begin tacking at the center of the front edge without drawing the covering too tight. Drive half a dozen tacks each way from the center, spacing them about 1 in. apart, and then drive the same number at the back, pulling the covering down evenly. Fold the edge or the tacks will pull out. Use just enough tacks to hold the covering and then fill the spaces later, tacking the ends last. Be sure to space the tacks evenly. After cutting the back coverings, tack them at the bottom first, then





about one-third of the way up the sides, leaving the covering slack so that the filling can be pressed into the corners and down to the lower edge. Roll the filler up in a layer of felted cotton, as in Fig. 7, and press the wad under the covering, forcing it well into the corners, as in Fig. 8. Tack the sides as the cushion is being filled, driving the tacks in each side alternately. Fig. 6 shows how the arms are filled in the same way. If you notice that the tacks come out easily when starting, substitute heavier ones. Drive the tacks in line so that upholsterers' gimp, which is applied last, will cover the edge of the cloth and the tacks as well. The gimp should be about  $\frac{1}{2}$  or  $\frac{3}{8}$  in. wide, matching the covering. Gimp nails are used to fasten it. Lastly, cover the bottom and back of the cushions and seats with black cambric or some similar cloth to keep out dust, and finish the woodwork. Fig. 9 shows a completed job which is as good as new.

#### Pad for Wiping Soldering Iron Clips on Worker's Arm

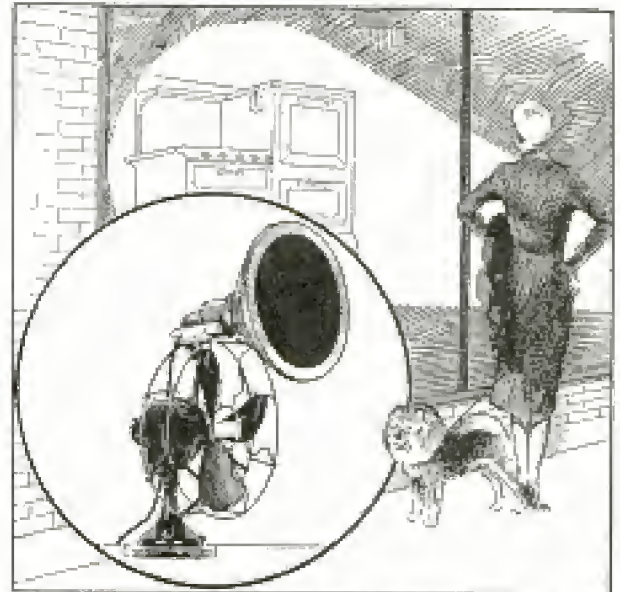


Tinsmiths, electricians and others who use a soldering iron on jobs where it is necessary to move about a great deal, will find the wiping pad shown in the drawing very

useful. It consists of a strip of felt, or other heavy cloth, about 2 in. wide, rolled compactly and fitted snugly into a can cover to the bottom of which it is glued. A spring clip is soldered to the back of the cover to fit over the worker's arm, where the pad is in a convenient position for constant use.—G. E. Hendrickson, Argyle, Wis.

#### Paraffin Makes Corks Chemical-Resistant

Corks dipped in paraffin, heated to the smoking point, will resist chemicals, as well as worms and insects. This treatment makes the corks air-tight for use in bottling such liquids as grape juice.



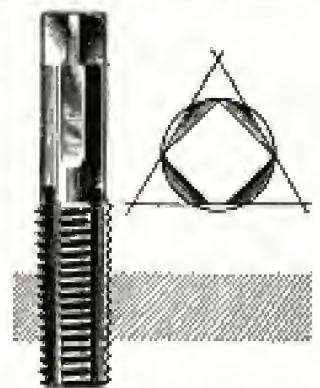
Floodlight Attached to Large Oscillating Fan Plays Back and Forth on Window Display

#### Oscillating Fan Supports Floodlight for Window Display

The attractiveness of a window display can be increased by fastening a floodlight to a large oscillating fan. Both the fan and light are connected to the light circuit. In operation, the beam of light plays back and forth on the objects in the window and is sure to catch the eye of passers-by. If desired, the fan and light can be concealed in a corner.

#### To Hold Tap in a Three-Jaw Chuck

By grinding a tap or other round-shank tool on three sides as shown in the drawing, it can be held in a three-jaw chuck without slipping. In grinding, the squared end of the tap is, of course, not touched, but the metal is removed on the round section below. Care must be taken to grind the three flats down exactly the same distance so that the tap will be held centrally in the chuck. This practice has been found highly useful and timesaving in a large shop.



Small emery wheels may be dressed by using an old glass cutter of the type embodying a hard-steel wheel.



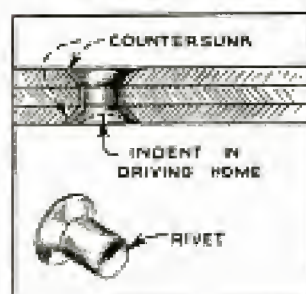


Rubber-Tired Coaster Wheels Fitted to Ladder Make It Easy to Raise against Walls

### Wheeled Ladder Is Easily Raised

By equipping a long, heavy ladder with a couple of rubber-tired coaster wheels at the top end as shown, it can be raised easily against the side of a building without marring the walls. The axle for the wheels is an iron rod of the proper size, and is fastened to the ladder with pipe straps. If desired, the wheel axle can be made detachable, so that the ladder can be more conveniently stored. In the particular instance illustrated, the wheel assembly was made so that, after the ladder was placed in the proper position, the wheels were let back and the end of the ladder would come in contact with the wall in the usual way, which was done by means of pulling a cord, as indicated.

### Countersunk Rivets Are Water-Tight



It is usually considered almost impossible to rivet three sheets of metal together so that it will be waterproof. Here is a simple method of doing this: First drill the hole so that the rivets will be a snug fit. Countersink both ends of the hole and use rivets to match. The head

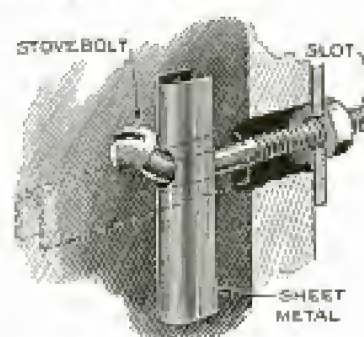
will fit tight on one side and the peened end on the other, the latter being indented in the center to spread the sides apart.

### Darkened Nests Prevent Egg Eating

To break hens of the habit of eating eggs, or prevent them from acquiring it, the following remedy has been found highly effective: Cover the fronts of the nests with gunny sacks or canvas curtains to make them dark. A dark nest is always more attractive to a laying hen, and I have never known a hen to eat an egg in such a nest. The curtains should fall to within 2 in. of the bottom of the nests, and each should have a V-shaped piece, about 5 by 6 in. in size, cut out for air and a little light. For nests used by sitting hens, the curtains should cover the entire front and only a very small piece is cut out at the top.—Bruce Swope, Danville, Pa.

### An Emergency Toggle Bolt

In the absence of a toggle bolt, a good substitute can be made from a machine screw and a strip of sheet metal bent to U-shape. The head of the



screw is bent over slightly so that the U-piece, which has a hole drilled through the ridge to fit the screw, can assume the position indicated by the dotted lines. It is readily seen how this piece can then be slipped into a hole, after which the screw is drawn up by driving home the nut at the other end. A slot is cut with a hacksaw in the threaded end of the screw to take the end of a screwdriver, which is used to prevent the screw from turning while the nut is driven down. The hole in the anchor should be off center so that the latter falls down.

### Dressing Down the Edge of Binding Doors

It is a difficult and troublesome job to take down a binding door, plane off the bottom and hang it again, and often it is



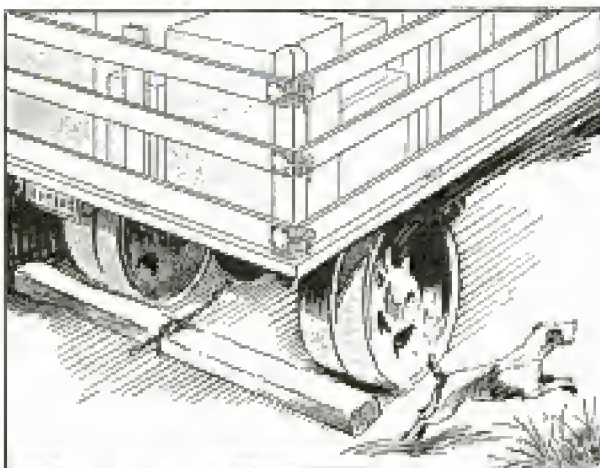
necessary to repeat the operation. An easier method is as follows: Get a cheap saw and file, or grind, off the teeth on the right-hand side, so that they will not scratch or mar the threshold. With this side down, place the saw under one stile, which does not swell, and close the door. Then saw off the lower edge of the door. If one cut is not enough, it may be repeated. A rip saw will be found especially suitable for this purpose.

#### Kerosene Applied with Blowtorch Silences Auto Squeaks

Squeaks and rattles under a car can often be silenced by using a regular blowtorch filled with kerosene. With the torch pumped up, squirt the pinlike stream of kerosene on the springs, body bolts, brake links, and fender bolts. It will then be easy to turn the bolts tight and thereby stop the rattle.

#### Wooden Beam Chained to Truck Serves as a Brake

When climbing a steep grade with a heavily loaded truck, a driver found the motor could not pull the load even in the lowest gear. The brakes held the truck, but after the motor was accelerated and the brakes released, the truck invariably rolled a few feet backward. Making no headway in this way, the driver chained a heavy wooden beam to the truck so that it would drag along just behind the rear wheels as shown. The truck settled against the beam when rolling back and made it possible to climb the grade slowly.



Checking the Back Roll of Truck on Steep Grade with a Wooden Beam behind Rear Wheels

#### Holder to Cut Disks with a Torch



Simple Holder Which Makes It Easy to Cut Circles with an Acetylene Torch

For cutting circles with an acetylene torch, a pivoted holder can be used. It consists of a base drilled to permit the rotation of a small steel post. The upper end of the post is turned down to a smaller diameter and this part is threaded for a nut. A flat-iron bracket, slotted as shown to slide over the threaded section of the post, is then bent to shape to hold the torch. When adjusted to the proper diameter, the nut on the post is driven tight to hold the bracket, and the torch is slipped in position.

#### Cutting Corners on Paper Stock

Occasionally a printer is called upon to cut off corners at an odd angle, when trimming sheets. To do this, first cut one sheet carefully to the shape desired, then place it on the bed of the cutter with the trimmed corner exactly at the cutting line. Fasten two pieces of wood furniture of the 10-in. width to the bed of the cutter with hand clamps to serve as stops. It is then no trouble to butt the paper against the stops and obtain the angle for the cut.—Robert A. Foss, Laconia, N. H.

By laying three strips of  $\frac{1}{2}$ -in. adhesive tape on the sides of a draftsman's triangle, slipping is eliminated.



A-337



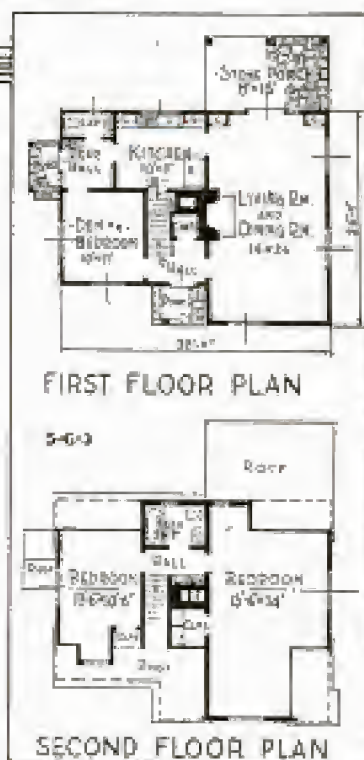
© Architects' Small House Service Bureau, Inc.

Plan 5-G-3

**H**OUSE designs are not "inspirations." Each one represents the solution to a certain problem; that is, if it is worth anything.

Suppose you are the architect's client and say to him: "Here is what I want; first, no dining room: second, a downstairs bedroom: third, a downstairs lavatory that can be made into a bathroom for the time being; fourth, a porch; fifth, a second story that can remain an attic for the time being, but can afterward be arranged with bedrooms and bath without heavy expense as to that first or last, and finally, an inexpensive home that will look inviting." That would be a problem for the designer. This design is the answer to it. The lavatory can be enlarged to take a tub and that will give you a complete one-bedroom house without finishing the attic. Later on, if you desire or if you should have to sell, the building of a single doorway between kitchen and den transforms this room into a dining room.

This is as it should be. The house without a dining room is sometimes hard to finance. The market at the present time for these houses is slow no matter how reasonable the dining-room-less house may be. But there would be no financing difficulty for this plan. A fine plan, a charming exterior, an inexpensive home to build. If the plan scheme suits you, you can't go wrong with this one.



The Architects' Small House Service Bureau of the United States, Inc., was formed to furnish a complete and dependable small-house plan service at moderate cost. For information regarding the blueprints and specifications address the bureau at 1200 Second Avenue, South, in Minneapolis, Minn., from which also a booklet, containing twenty-seven selected small-house plans, may be had for the price of 10 cents. The bureau is under the control of the American Institute of Architects.





Working on "Yankee" ratchet, the handle moves to and fro with your hand. (ABOVE)

Save time, trouble, temper . . . "Yankee" makes a ratchet do the hard jobs.



UNLESS a tool is ingenious—designed to do faster, better work or to operate in ways and places impossible with other tools, it cannot bear the name "YANKEE."

"Yankee" way is the modern way of taking care of screws in all jobs. Always handy and quick!

Let hardware dealer show you "Yankee" Ratchet Screw-drivers.

Grasp handle. Turn to and fro. Handle, working on ratchet, turns back with your hand. No letting go. No release of pressure on bit in screwhead. No friction. And not a moment or motion lost!

### "Yankee" Ratchet Screw-drivers

No. 10—Eight blade lengths, 2" to 12". Priced from 65c up. Same in No. 11.

No. 15—Thumb-turn starts wobbly screws. Blade,  $\frac{1}{8}$ " diameter. Six lengths, 2" to 8". 70c up.



Tiny screw started by turning blade with thumb and finger in contact with knurled washer.

## "YANKEE" TOOLS

— TO HELP YOU MAKE THINGS —

NORTH BROS. MFG. CO., Lehigh Avenue, Philadelphia, U. S. A.

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Keds sell for \$1.00, \$1.25, \$1.50, \$1.75, and up to \$4.00. The more you pay, the more you get—but full value whatever you spend.

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Keds are designed to give you fast, sure footwork. Keds' rugged canvas tops bring snug, sturdy support to your ankles. Keds' outsoles give you a sure grip on any playing surface.

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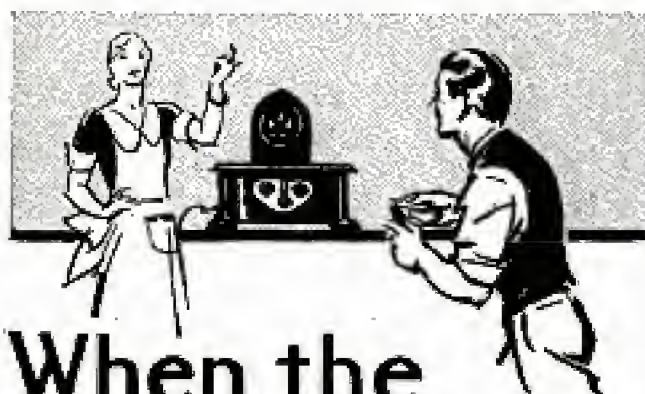
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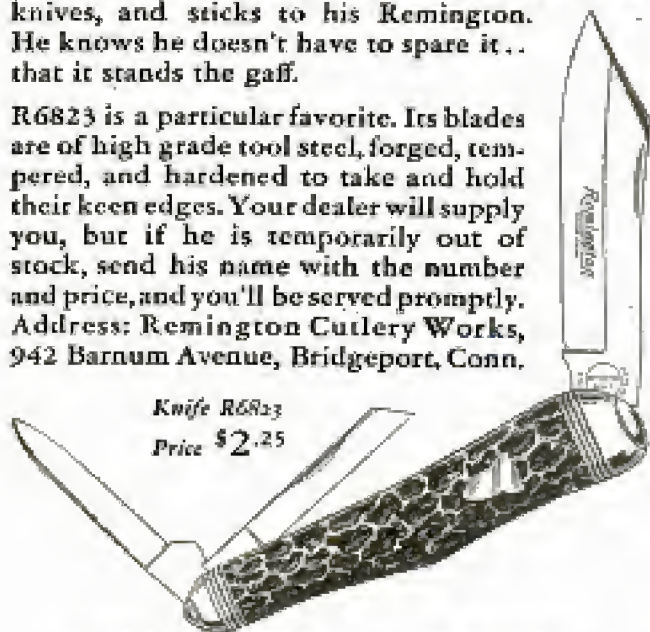
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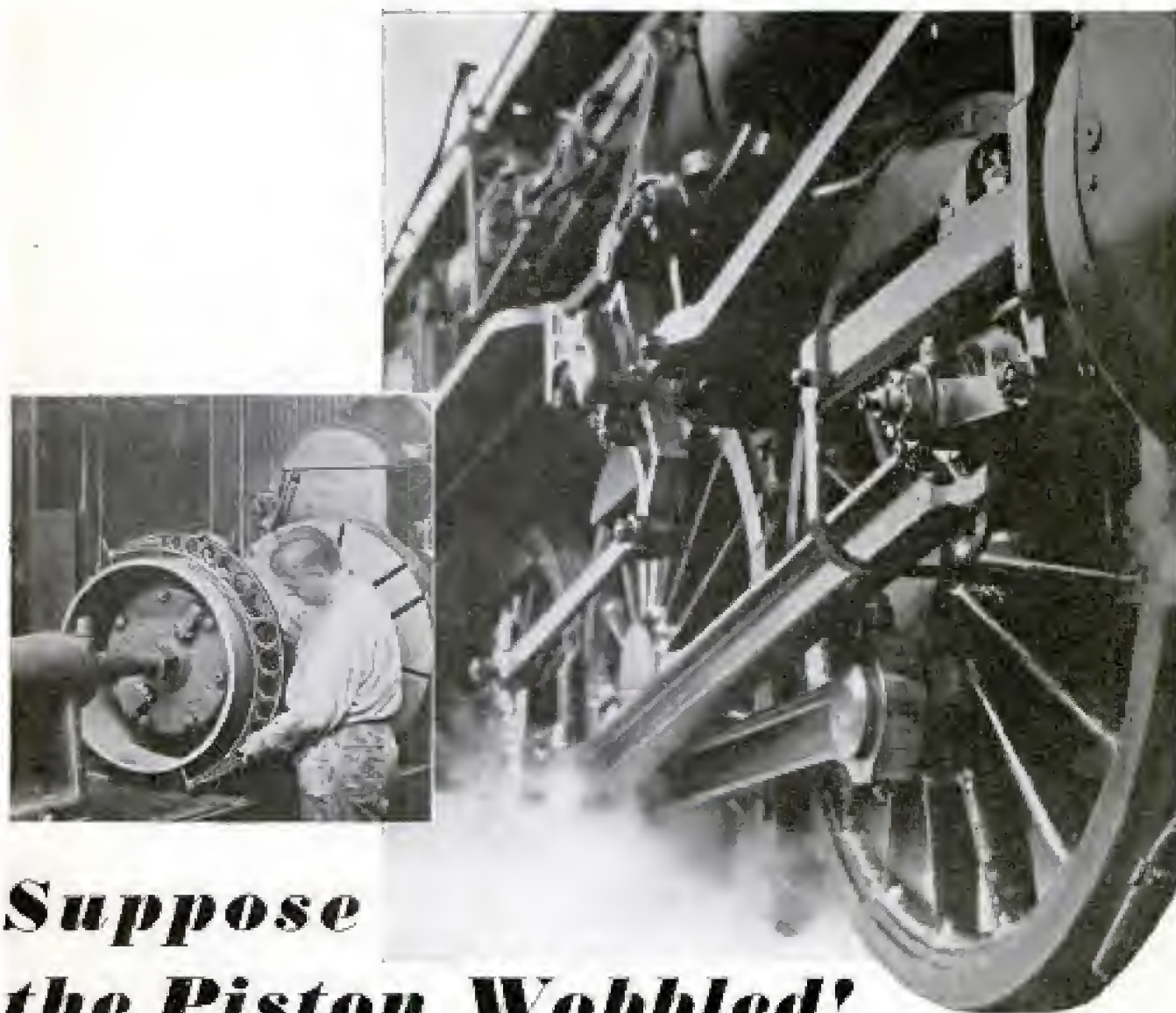
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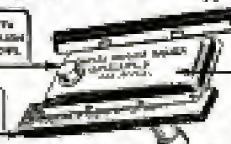
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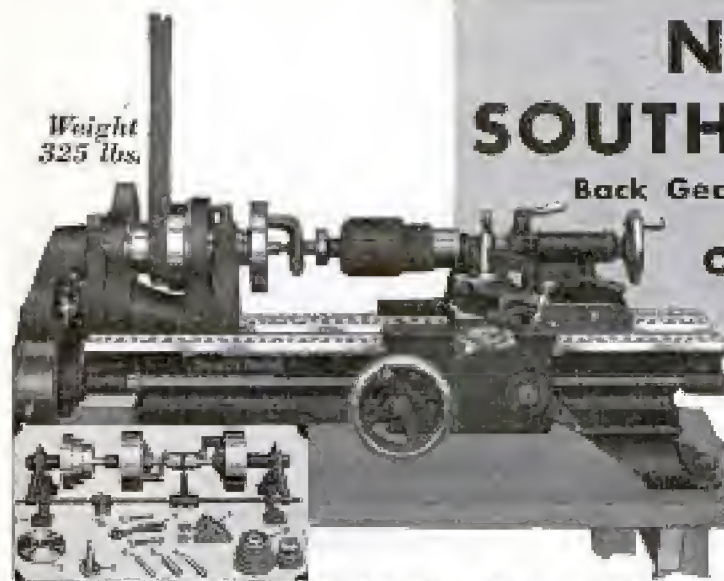
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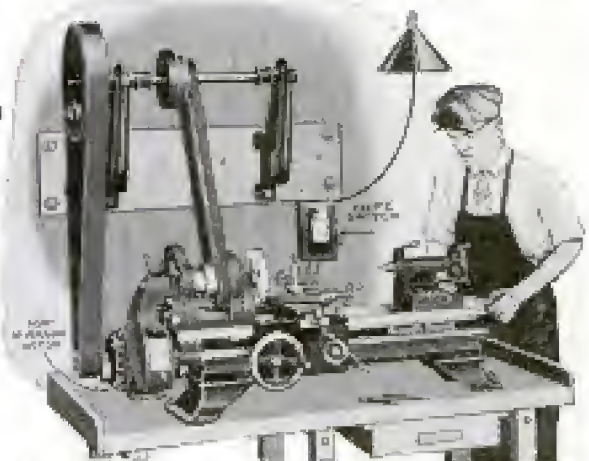
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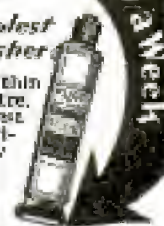
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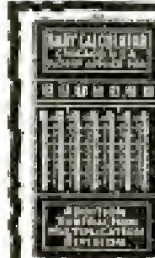


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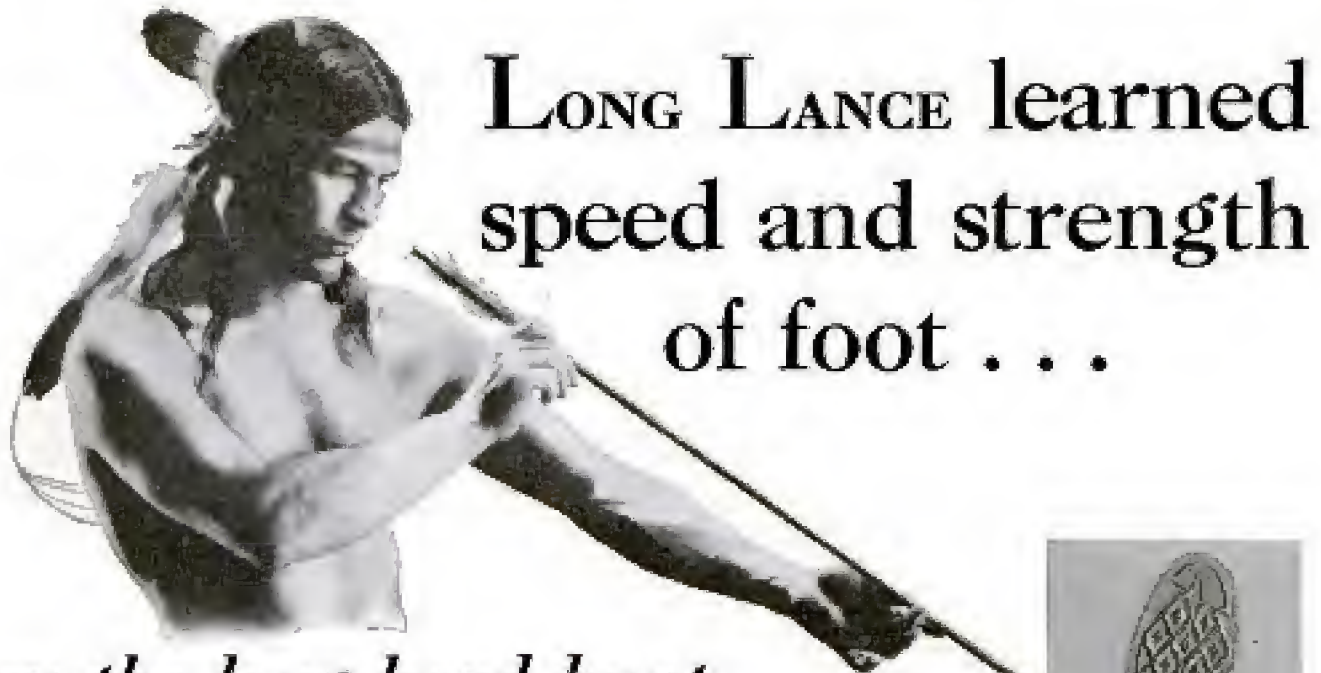
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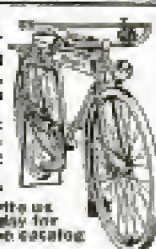
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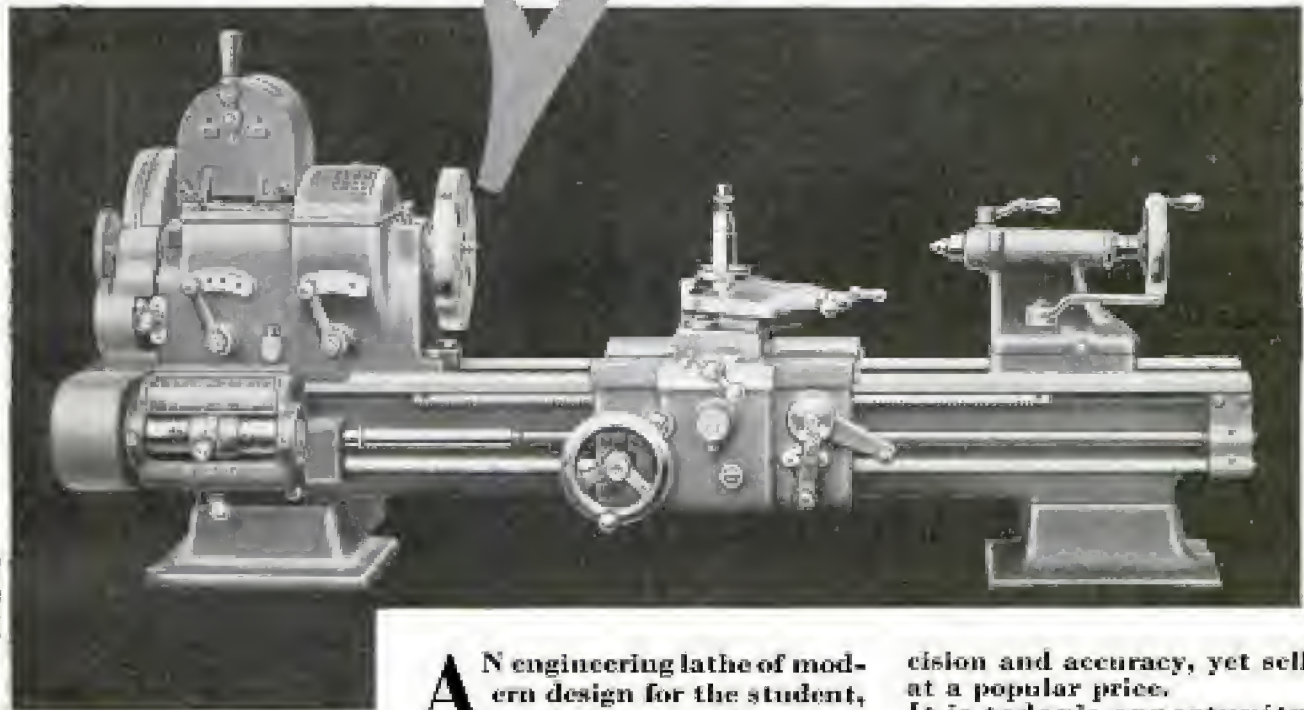
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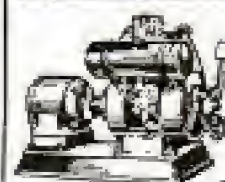


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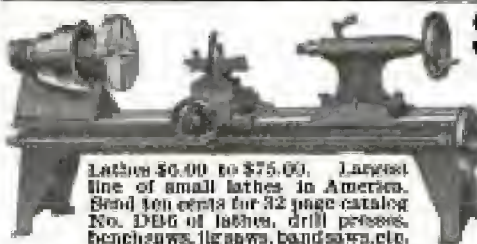
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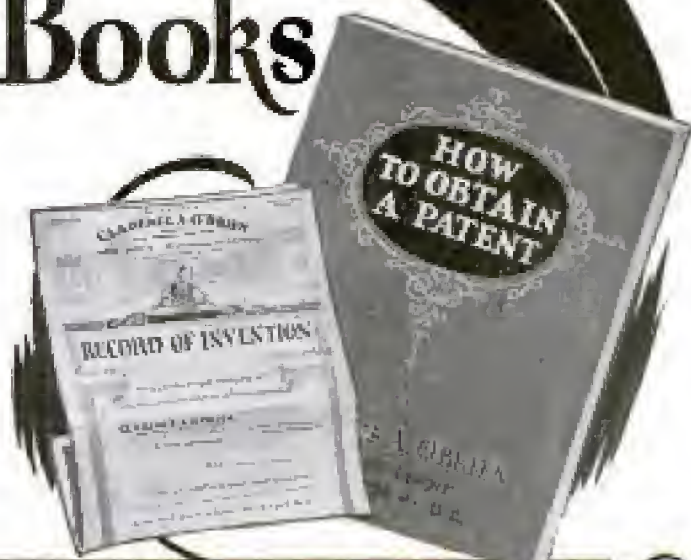
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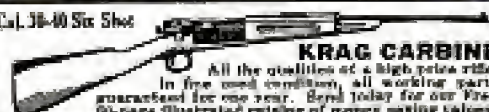
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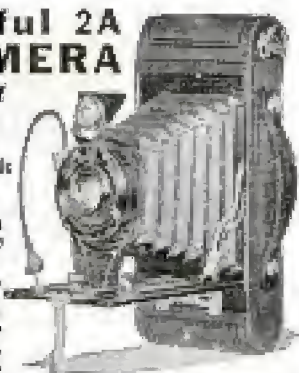
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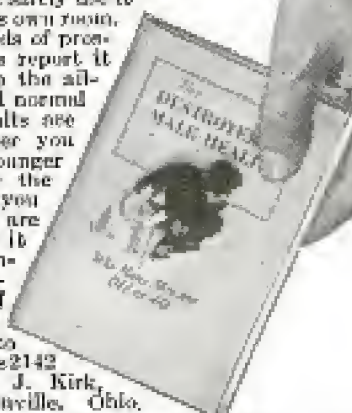
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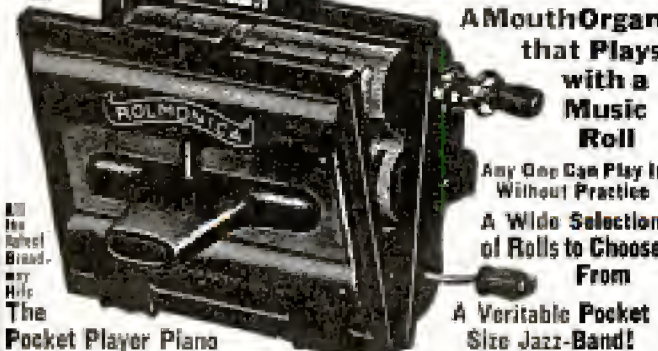
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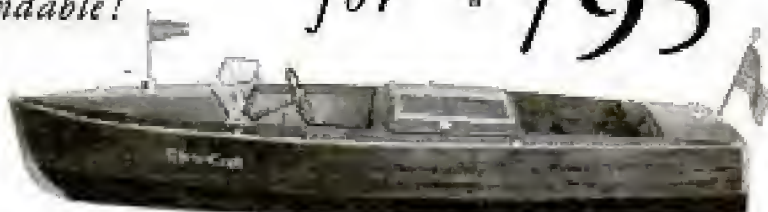
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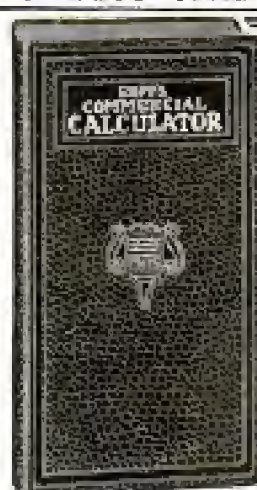


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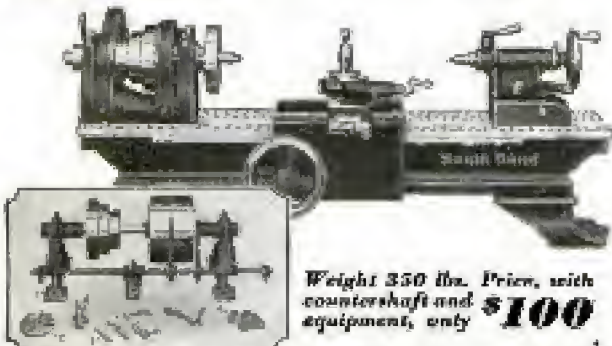
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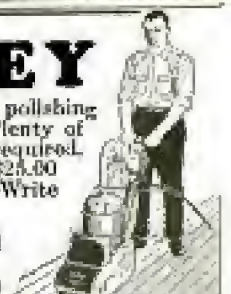
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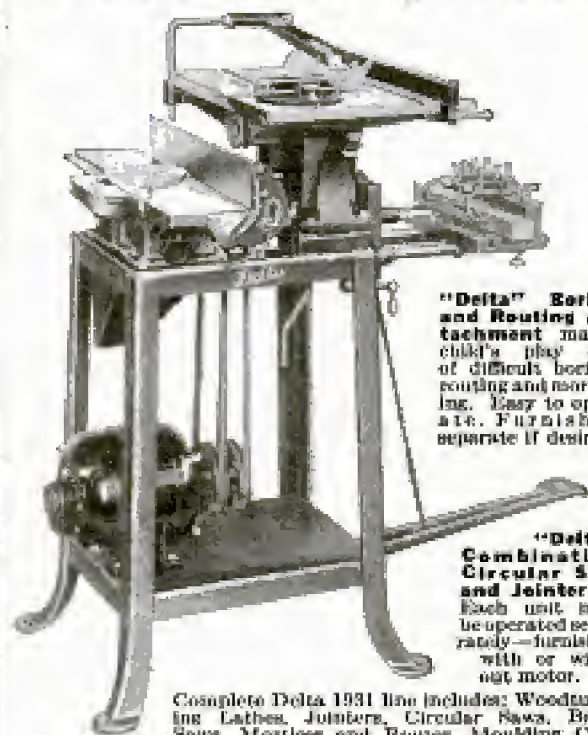
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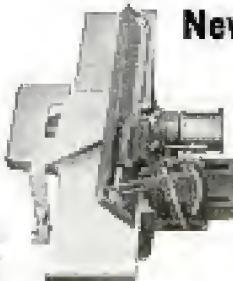
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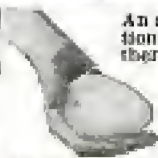
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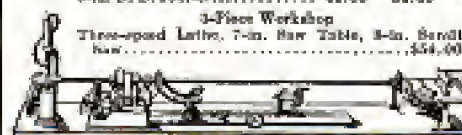
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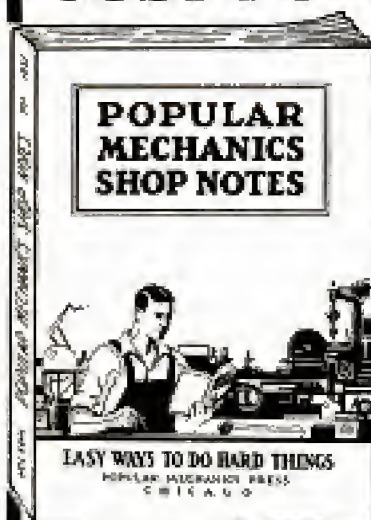
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# Ethyl is the *most practical* anti-knock ingredient known

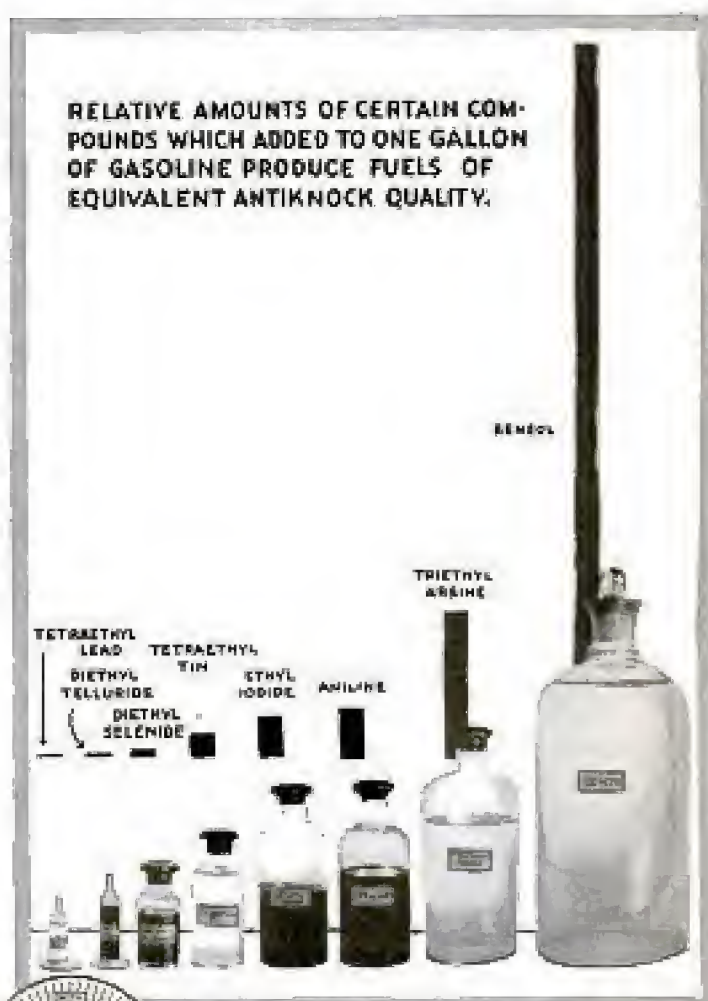
## Compare!

IT took seven years of testing and experimenting to produce Ethyl fluid. During that time, 33,000 chemical compounds were studied.

All the compounds shown in this picture have anti-knock qualities. None of them is nearly so practical as tetraethyl lead, which is the active ingredient in Ethyl fluid. Some are required in such large quantities that more than the total available world supply would be needed to treat all the gasoline requiring anti-knock. Others do not vaporize easily and completely.

Even tetraethyl lead cannot be used alone. It is mixed with other chemicals which combine with it at the time of combustion to form a gas that passes out of the cylinders.

The red dye which is in all Ethyl fluid has nothing whatever to do with its power to control combustion. The dye is added solely to give an identifying color. It is the tetraethyl lead in Ethyl fluid that prevents the uneven explosions that cause power-waste, harmful "knock" and overheating. It *controls combustion* so that power is delivered



to the pistons with a smoothly increasing pressure that brings out the maximum performance of any car.

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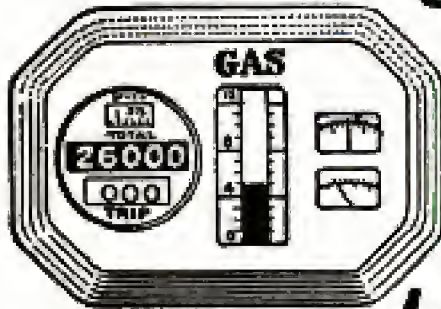
Ethyl Gasoline Corporation,  
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# ETHYL GASOLINE

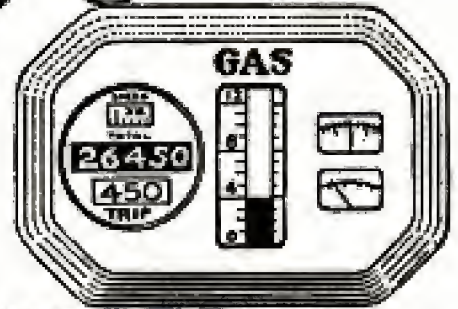
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# 450 MILES in a gallon of gas



*startling  
statement  
of famous  
Automotive Engineers*



How to increase gasoline mileage has been a problem that Automotive Engineers have been trying for years to solve. Recently a world famous engineer made the statement that the energy produced by burning a gallon of gasoline would run an auto a distance of 450 miles. Other well known authorities go on record as saying that eventually it may be possible to get over four times as much out of gasoline as in the past.

## Amazing Whirlwind Device Saving Millions of Gallons of Gas for Auto Owners

The Whirlwind Carbureting device embodies scientific features which conserves part of the gasoline that formerly went to waste.

Letters coming into the office tell of record mileages resulting in amazing gas savings. Low gasoline mileage is reported on practically every make of car. Greater power and smoother running motors are also noticed by users. The cost of the Whirlwind is so little that, basing its gas saving features even on the most modest reports, it would pay for itself almost immediately and then save many, many dollars for its owner by reducing gasoline consumption.

Car owners all over the world are saving money every day with the Whirlwind, besides having better operating motors. Think what this means on your own car. Figure up your savings—enough for a radio—a bank account—added pleasures. Why let the Oil Companies profit by your waste? Find out about this amazing little device that will pay for itself every few weeks in gas saving alone.

### FITS ALL CARS

In just a few minutes the Whirlwind can be installed on any make of car, truck or tractor. It's actually less work than changing your oil or putting water in the battery. No drilling, tapping or changes of any kind necessary. It is guaranteed to work perfectly on any make of car, truck or tractor, large or small, new model or old model. The more you drive the more you will save.

### SALESMEN and DISTRIBUTORS WANTED To Make Up To \$100.00 a Week and More

Whirlwind men are making big profits supplying this fast-selling device that car owners cannot afford to be without. Good territory is still open. Free sample offer to workers. Full particulars sent on request. Just check the coupon.

**WHIRLWIND MANUFACTURING CO.**  
Dept. 608-A, Station C. Milwaukee, Wis.

### GUARANTEE

No matter what kind of a car you have—no matter how big a gas eater it is—the Whirlwind will save you money. We absolutely guarantee that the Whirlwind will more than save its cost in gasoline alone within thirty days, or the trial will cost you nothing. We invite you to test it at our risk and expense. You are to be the sole judge.

### FREE OFFER COUPON

WHIRLWIND MANUFACTURING CO.,  
Dept. 608-A, Station C, Milwaukee, Wis.

Gentlemen: You may send me full particulars of your Whirlwind Carbureting device and tell me how I can get one free. This does not obligate me in any way whatever.

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Address.....

City.....State.....

( ) Check here if you are interested in full or part time salesman position.



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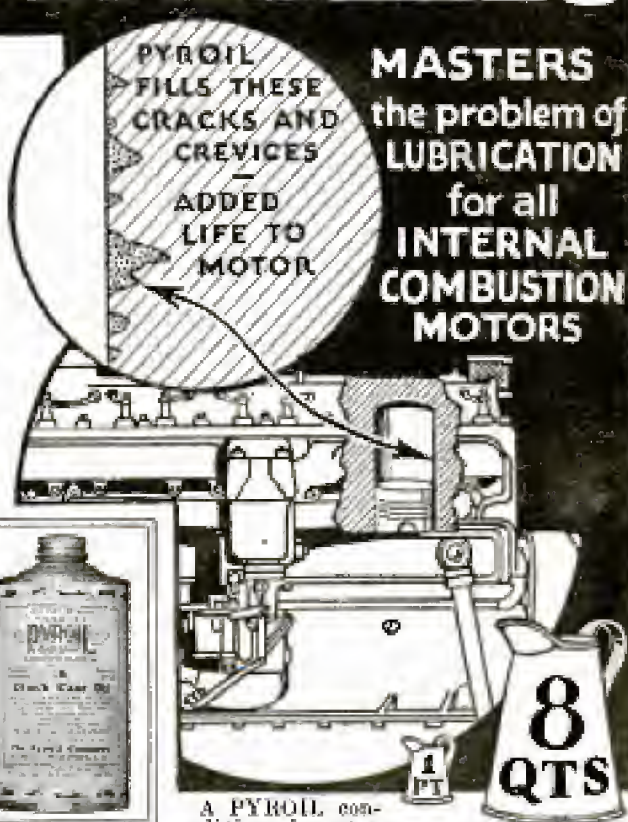
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A PYROIL conditioned motor can run 20 to 25 miles at 25 mi. per hr. with all oil drained from crankcase—with no harm to motor!

Only 1 pt. of  
**PYROIL** to  
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Protected territory if you want it.

Clip coupon and mail at once for positive proof and facts that will amaze you. **QUICK ACTION NECESSARY.**

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Mr. W. V. Kidder, Pres., The Pyroil Company,  
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Send me at once the amazing facts and proof of PYROIL—the greatest motor oil product ever discovered.

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# Popular faces are *shaved with* Barbasol

\* "It's a scandal the way men have suffered for years with the old razor pull, and rub and brush and lather. Now, I find Barbasol has eliminated all that—it's so quick and clean and easy. I give it a rousing encore every morning."

*George White*



George White, producer of the annual George White "SCANDALS" and the musical comedy hit, "FLYING HIGH"

\* Barbasol testimonials are not paid for

FOR two thousand years, men had to shave with that popular substance invented to remove dirt because that's all there was—until Barbasol was created for the sole purpose of softening whiskers and getting them shaved off *clean* and *easy* without hurting the face.

Barbasol is modern! It does not lather like soap, at all. It was invented and perfected to make tough whiskers in tender skins take a trimming—and like it! It softens them like magic, makes them cut easy. At the same time it holds them straight up to the blade.

And here's the test of a *real* shaving cream—can you shave *twice* a day with it? Thousands of men write us saying that two Barbasol shaves a day is *fun*. That's how fine it makes your face feel. That's why Barbasol Believers have made it the world's fastest seller.

## Follow These Directions and You'll Follow the Crowd

1. Wet your face and leave it wet . . . 2. Spread on Barbasol. Don't rub it in—just be sure it's spread *on every* between the hairs . . . 3. Wet a good blade and—SHAVE.


That's all you have to do to get the finest shave in the world. It's simple, easy, quick. Try it today. Generous tubes at all druggists', 35¢ and 65¢, will quickly make YOU a Barbasol Believer, too.

**FREE**—a refillable Tefra Toothbrush, value 75¢, with your first name or initial on handle. Finest quality. Mail entire empty Barbasol carton (35¢ or 65¢ size, or jar) with your name and address. We will mail toothbrush absolutely free. The Barbasol Company, Department 30, Indianapolis, Indiana.



Listen to Barbasol Ben and His Boys—Laughs—and the songs you can't forget—the happiest entertainment on the air, Tune IN, every Monday, Wednesday and Friday evening at 8:15 Eastern Daylight Saving Time, Columbia Network: Stations WABC, WMAQ, WCAU, WXYZ, KMOX, WHK, WJAS, WNAC, WCAO, WKBW, WISN, KMBC, WCCO, WKRC, WFBM, WMAL, WEAN, WSPD, KOIL, WADC, WFBL, WDRC, WPG.



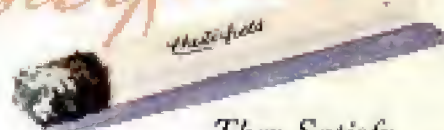
  
“I’ve followed the ‘Big Top’  
—says Chesterfield



*yet* you’ll find me at home with the folks”

Children or grown-ups, we swallow the circus whole—and like it. But ballyhoo has no place in cigarette choice. What counts in a cigarette is how it *tastes*. And that’s first a matter of how good the tobaccos are. Chesterfield uses tobaccos of better quality—nothing else—and blends and “cross-blends” them to give you *more* taste, *more* aroma. And greater mildness too!

*Chesterfield*



*They Satisfy  
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